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NEWS IN BRIEF

Nitch in Case takeover

FURTHER talks are to be held between Case and its US sister Paradyne following the latter's withdrawal of its bid for the UK communications equipment maker on the grounds that its buoyant share price now valued Case too highly (CW, March 13).

When made, the bid was worth \$11 million; it climbed to about \$20 million last month but, at Friday's close on Wall Street, Paradyne's offer was worth \$17.3 million. It is expected that new terms will be agreed.

Savings on 3031s

IBM users can save 25% on an IBM 3031 monthly rental contract if they opt instead for one of the short-term leases just introduced by National Advanced Systems for its AS/5000, previously called the AS/7031. The minimum contract term offered by National is 12 months and savings of more than \$150,000 over a similar IBM system can be achieved, according to National.

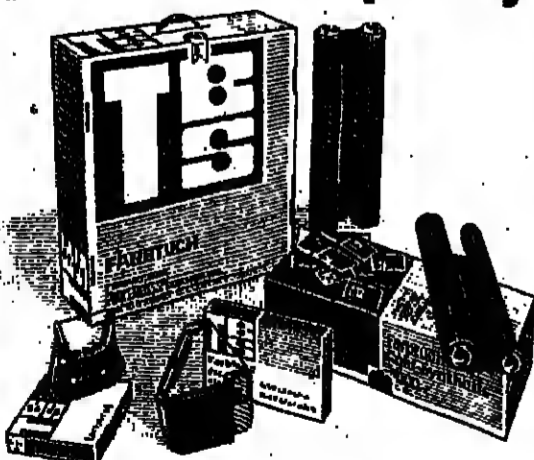
\$4m PoS order

FOUR divisions of the US company Associated Dry Goods have placed an order for Datatrol point-of-sale systems worth \$4 million. The orders cover the installation of over 1,200 Datatrol RS6100 PoS terminals.

Micro directory

ASLIB, the association of special libraries, is compiling a directory of microcomputer software suitable for use in libraries and information services. The project has been commissioned by the British Library.

Ribbons for a lasting impression of quality



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COMPUTER WEEKLY

Teachers produce national software standards

A SET of national standards for educational software has been produced by the teachers' organisation Microcomputer Users in Secondary Education, to make it easier for schools to swap programs. A common area of basic has been identified, and if adhered to it will allow programs to be run on all the personal computers commonly in use in schools, and a standard method of presentation by programs to pupils has been specified.

The software dealt with is all for computer-aided learning. The general style of programs and how they should be constructed has also been worked out, and this should facilitate the building up of a standard set of modules that can be used in any program.

The common area of Basic that has been identified, including the 380Z, Tandy, Apple, and Pet machines, is fairly wide at the moment but MUSE is concerned that it be kept that way. Extensions into file handling and graphics are now being worked on.

Copies of the 34-page standard can be obtained for £1 from Charles Sweeten at 10 Rockingham Hills, Oundle, Northants.

IBM's 1/2p-Mbyte mass store add-on

ONLINE magnetic storage costing a remarkably inexpensive 0.6p per megabyte per month is now available from IBM in the form of an add-on module for the 3850 mass storage system. Called the Storage Extension Frame it provides 67,000 megabytes at a purchase price of less than £12,000 and it could make the 3850 a more attractive proposition for a wider range of users than the handful in the UK that have installed the 3850 so far.

Prestel push

JAPANESE, Canadian and French companies will join the Post Office and members of the UK viewdata industry in demonstrating their national viewdata systems at Viewdata 80, in Wembley next week.

The exhibition marks the start of the big push for Prestel with the Post Office's demonstration filling the two-minute advertisement slot on ITV's News At Ten programme for the whole of next week, and set makers promising to boost production to several hundred a week.

Depending on the existing size of a system, between one and three SEFs can be added to a 3850 in the field up to the maximum of 256,000 megabytes per mass storage facility. Expanding by using the existing data extension frame costs considerably more — £180,000 per 67,000-megabyte unit.

But access times with the SEF are much slower because it comes with fewer devices for reading information from the cartridges of 3-inch wide magnetic tape that slot into the honeycomb structure of the 3850.

SEFs can be added to six of the

eight existing A and B type 3850 models to create 12 new models. The existing 102,000-megabyte B02 for example, can be expanded to the new 169,000-megabyte model B12 by adding one SEF. The total cost of a B12 is £848,376. In contrast the 169,000-megabyte model B03 which is a B02 with one data extension unit added, costs £815,611.

The smallest 3850 system, the A01, with 35,000 megabytes can be expanded to the new 236,000 megabyte model A31 by adding three SEFs at a cost of about £30,000, bringing the total cost of the A31 to about £384,000.

Personal software for TI managers

From front page

"The Pascal comes with the operating system from UCSD, the Fortran compiler is an Ansil 77, Pascal written in Pascal by Silicon Valley Software of Sunnyvale. The Basic will be TI's own."

"It isn't ready yet, but it will be compiled rather than interpreted and will be called Small Business Computer Basic."

The six packages offered include a comprehensive word processing package; a simple

interactive database system; an arithmetic and reporting package; a management science package designed for internal capital allocation; a universal data entry program; a communications package designed to interface with other corporate systems, using IBM's IMS and TSO and to enable the personal systems to communicate with each other.

Hardware used by TI departments will come from the company's mini and microcomputer range and all the software has been designed to fit in a 64K-byte processor using the TI TMS-9900 16-bit microprocessor, such as the 77 intelligent terminal and the DS 9901 package system.

Internal users get a substan-

tial discount on these products, and many departments already have large TI minicomputers running the DX10 multi-user operating system. The UCSD Pascal operating system can run, albeit inefficiently, under DX10 as a 64K-byte task.

Pre-release customers have already ordered \$40,000 worth of the software mainly to test it under DX10. The full suite of programs costs a manager \$2,500.

The operating system is a single user system, but a new release coming shortly will support concurrent processing. When it is available, Bandy will adopt it mainly to support things like spooling and printing when another job is running.

Stake in General Automation

From front page

its hardware companies. The reorganisation at General Automation, instituted when Frank Grisanti took over as caretaker chief executive following the boardroom coup which overthrew founder and former chief executive Larry Goshorn, is now complete.

GA has shut down its Tai-Star subsidiary which produced text processing systems for newspapers, but text processors will

continue to be sold by another subsidiary, Computek, which also makes intelligent terminals, needed in GA's factory data collection business.

GA will not undertake any more application software development, and will concentrate primarily on industrial automation for the "factory of the future" and on banking systems.

For its second quarter to December, General Automation reported a loss of \$1 million on turnover of \$32.1 million.

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\$55,000 IBM compatible system launched

AN IBM-compatible system costing as little as \$55,000 in the US, including 70 megabyte disc storage, has been introduced by Formation Inc.

Called the Formation Mini system is configured around a processor designed and built by Formation Inc.

The processor employs a microcomputer architecture according to Formation Inc. is expensive — than the IBM compatible V32 mini built Two Pl of Sunnyvale, California.

Like the V32 the Formation 4000 processor can execute IBM 370 instruction set in Formations says that it can run under OS/VS1, VM 370 or DOS/VS.

In addition, Formation offers data management screen handling software runs with VM370 and DOS/VS, both relational and key-based facilities.

Formation is selling the system on OEM basis at the moment, offering that machine to system houses for IBM machine. Formation emphasises that it is selling complete systems, including peripherals, and a price of about \$100,000 for average size system.

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Briefing PO hits back at French

THE Post Office has refused permission to the French PTT to attach its Teletel viewdata equipment to the UK telephone network for demonstrations at Viewdata 80 now running at Wembley, until a satisfactory reciprocal agreement is reached.

France was refused connection in France several times last year (CW, June 28, 1979) and a Post Office spokesman said the restricted facilities finally given at the Computers in Society seminar in Paris last September were not acceptable as a basis for agreement.

DG prices up

PRICE increases of up to 10% have been announced by Data General for all its processors except commercial versions of the Eclipse. Some peripheral, terminal and interface prices have also gone up. The DG increases follow closely on price rises of up to 20% made by Digital Equipment (see page 9).

New MD named

NATIONAL Advanced Systems (UK), the UK subsidiary of National Advanced Systems Corp, has a new managing director. He is John Clements (pictured above) who joined the organisation in January 1978 when it was part of ICL. He was formerly Southern region sales manager. The former MD, Geoff Meadowcroft, left last year.

Bureau taken over

G.B. JACKSON Associates, the computer services group based at Chichester, has bought the bureau side of Scan Data International, Scan Data Centres. It operates two ICL 2804s.

\$55,000 banking

NATIONAL Research Development Corporation is backing Information Services and Equipment with half of the £110,000 needed to set up full-scale production of its coin-operated Prestel terminal.

Translation package

A MAINFRAME package for computer assisted translation, Document Translation Assistant Facility, has been announced by IBM. Supporting source text entry and display, dictionary search, target text entry, correction and manipulation, and preparation for typesetting, DTAF runs under VM/CMS and MVS/TSO and will be available this summer.

\$ African deal

SOUTH AFRICA'S largest industrial conglomerate, Barlows, has entered the computer field by taking a 51% interest in local computer services, the General and National Semiconductor.

COMPUTER WEEKLY

Price 20p

Thursday, March 27, 1980

Number 699

Viewdata on ICL's ME29

THE most striking feature of the new ICL ME29, successor to the 2803 series, is the availability of viewdata software which is fully compatible with the Post Office's Prestel system.

The software is developed from Thorn-EMI's Thornel system which runs on ICL 1900s. It will support up to 192 standard viewdata terminals or adapted television sets, but access from these is at present confined to the viewdata file on the ME29. ICL is demonstrating the facility with Thorn's Dataflex viewdata terminals and is discussing with Thorn-EMI the best way to market viewdata systems jointly.

ICL is enthusiastic about the possibilities of viewdata and is keen to lend its weight in the Post Office's belated push behind the concept.

The belief in ICL is that viewdata will be, at least initially, an additional reason

for a company to install an ME29, and that only in exceptional circumstances would an ME29 be used entirely as the basis of an in-house viewdata system.

Thornel was developed by Thorn Television Rentals to run on ICL 1904S in Swindon. Thorn developed the software because of its requirement to keep its TV rental outlets informed on a daily basis. It uses the ICL Cream programme interface and Thorn, with an ICL 2872, is developing a VME/B version of the software (CW, November 22, 1979).

The software for the ME29 is in the final stages of testing, which should be finished within a month. No release date or price has been set, but it will almost certainly be offered on monthly rental only.

ME29 details: page 11



ME29 new processor — new look from ICL.

Systime enters micro market

A £8,000 microcomputer based on Intel chips but software compatible with Digital Equipment minicomputers is being developed by the UK systems house Systime to push the firm into the very bottom of the huge first-time user market. The move means that small users will be able to grow on to Systime's larger, DEC-based systems without having to have their software rewritten.

Amdahl into comms with US takeover

HAVING lost to NCR in its bid to acquire communications processor manufacturer, Comtan, Amdahl is set to buy Tran Telecommunications of Morinda, California.

Tran makes an integrated digital network system, the M3200, designed to carry transparently digital data, facsimile, voice or image. In an IBM environment it is not an SNA alternative but a transparent means of linking the 3705 front-end and the terminals. Amdahl's plan to buy Tran's 3705-compatible 2806 processor have not yet reached fruition (CW, January 10).

For an IBM SNA user, the M3200 offers benefits such as network diagnostics, with a CAMI as master controller. The network can also be used for message switching and, with an integrated protocol converter, to enable terminals to communicate in, say, SNA-SDLC to a 3705 and in DECnet-DDCMP to a PDP-11. Tran's Pacul system also allows X25 packet switching and circuit switching in the same network.

Tran also offers a time division multiplexing system, the M3200, with an internal rate of 1.544 Mbps.

Commenting on the proposed acquisition of Tran, Amdahl's UK marketing director, Peter Williams told Computer Weekly that he was very excited about the move. "Like Amdahl, Tran is

a high technology company in a field completely complementary to ours," he said.

Tron equipment is used in the Canadian Dataroute network and by W. H. Smith in the UK to allow simple keyboard-printer terminals to communicate with its ICL 2800s.

Amdahl is to issue Tran stockholders with up to 1.35 million Amdahl shares in a deal valuing Tran at about \$27 million. It is planned to run the company, which had a \$22 million turnover in 1979, as a separate subsidiary.

"We can write programs in Basic Plus under DEC's RSTS operating system and compile and run them unmodified on the new system," said Ian McNeill, head of development of Systime. "We have put a translator for some RSTS functions, such as inter-job communication, into the new system's operating system."

Systime is still working on the operating system but expects to develop packages later for small companies such as firms of accountants.

For about £20,000 a user will get a processor with 64K-bytes of memory, two Control Data dual-density discs, giving two megabytes of storage, and Systime's own matrix printer.

The company is preparing a desk-top version, and a model built into a desk, as well as a separate subsidiary.

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Turn to back page

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Redifon bid for office market

REDIFON has introduced its first products for the office market with a network system that combines word processing, viewdata, data entry and communications. Called the R1800, the series includes special user interface features such as hand printing input and ABC keyboards instead of the usual QWERTY type.

The model now being launched, the R1800/50, is at the middle of the range. Larger and smaller models will appear within the next year.

At the centre of the network is a "system manager" running on a new 16-bit processor, the R5000, which is claimed to be three times faster than Redifon's existing R3000A. Printers and up to 600 megabytes of disc storage are also centralised. Up to 32 video terminals and 64 Prestel-compatible viewdata units can be used.

The viewdata terminals are intended to provide management information around an office, with a way of broadcasting memos and sending messages without paper. Access is also possible over the public telephone network. Real time processing and data management can be carried out from the viewdata terminal.

New distributed processing and data entry systems have also been launched. The R800/70 provides increased throughput compared to existing R800 products and the two new data entry systems, the R300/70 and R400/70, similarly give improved performance.

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26B2

INSIDE THIS WEEK'S CW...

GAD SPECIAL	ALSO...
ON the eve of the CAD 80 conference we have a special supplement on computer-aided design which looks at the subject from the hardware and user angles. The supplement includes a preview of the conference, which features names from around the world.	Computervision on UKITO
Pages 21/24	Threat to CMC
COMMUNIST MINIS	Downtime by Chad
In a second report from West Germany's Leipzig Fair we and how the Communist countries, having developed copies of IBM systems, have turned their attention to producing DEC-compatible minicomputers.	Gill's Mythology
Page 14	Office systems study
	Page Six for programme
	Software file
	So Good
	Civil Service warning
	People and Events
	Micro News
	Company News
	Product Notes
	Advanced the design
	Sales file
	Obituary
	Q1 launch

JOB OPPORTUNITIES: PAGES 26-55

Downtime

by Chad

Soft verse—and worse

LET's face it, much of the stuff we have to read in this business is pretty turgid. So you can imagine my head spinning as, while ploughing through an announcement from a software house, I came across this Structural analyses Static and Dynamic; Elastic

plastic Creep and swelling; small and large deflections. Heat

transfer analyses Steady State and transient; conduction, convection and Radiation.

SIA's Female finite element modelling. Eigenvalue buckling analysis has been added

How delightful to know there is a secret poet in SIA's marketing office! Of course, it wasn't written out like that.

Maybe they have a word processor like the one I used to try to write poems on. Every time I made a correction it would remove all the carriage returns and cram the lines together into a solid paragraph. An automatic poetry-to-prose converter.

And could it convert prose into poetry? No, that takes genius.

Still, it's nice to come across art when one isn't looking for it. My former colleague Stephen Bell, who edited Software File, once found a note in a packet of cigarette papers that read

Howls of protest?

AN advert from a personal computer company "MAKE YOUR PET SING with our custom-designed music synthesiser system." My colleague Claire Gooding saw this and remarked "A friend of mine used to do that by stepping on her dog's tail." No complaints from animal lovers, please.

Leaves left Only live Leaves left Only live

Philistines might say that the paper trimmer was simply left out of alignment, but I like to think that somebody had suddenly left inspired to elegise about autumn.

It was allegedly Cardinal Newman who sent this classified advertisement in to The Times and got it accepted. AN ANGLICAN curate in want of a second-hand portable font will exchange for the same a portrait (in frame) of the Bishop-elect of Vernon.



"Now we're going to have to play truant from home!"

Groan!

A READER, B. J. Curtis, of Eastleigh, has written in me about our "1984" piece the other week on a computerised food warehouse with a capacity of 64,000 kilograms. He points that this surely should have read 64,000 kilograms.

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GILB'S MYTHODOLOGY

Professional development of computer people



Tom Gilb is an independent consultant, lecturer and author on computer topics.

I THINK most of us are well aware that professional development of computer people is not what we would want it to be. This applies whether we are the professional in question or whether we have a responsibility for such training. I'd like to explore some thoughts with the reader.

First, public courses. I'm in the business, and I'm not happy with the cost effectiveness of the courses I give. If a client bothers to ask me about what I think would be most effective, then I would answer that for what it costs to send two to five participants on a public course (with maybe 10 to 40 others in the same class from other firms) they could spend the same time in a practical tutoring mode on-site.

The trouble is that too few ask that question. They seem to assume that if I give a public course, then I believe in that method. I would personally prefer to deliver training in the context of a small group of people, solving their current problem.

Most of the principles can be taught during such an exercise. But the benefit, as one person who had been exposed to both modes of my teaching said, is "10 times more effective".

Of course it is: it is directly related to your current work problems. Not everyone is equally adept at transferring examples and principles from other contexts, as often taught on public courses, to their own work area.

Public courses have their mission. You can get an overview of a subject area, you can sample a teacher, and you can meet others from outside your ivory tower. Sometimes you can even get an interesting trip. In-house, project-oriented tutoring should be more actively considered as a teaching mode.

While we are on the subject of public courses, I'd like to see participants and managers more actively practising what they learn immediately after the course. Participation in a week's course should carry with it the obligation to "produce" something practical afterwards.

I am sure there are at least 100 traditional excuses for doing nothing. But management should make it a practice to try to get at least one new idea from each course implemented immediately after the course. In some practical context if possible with paid further study time, if necessary. Otherwise, time spent at the course may well be wasted.

I have told of the merits of the Fagan/IBM Inspection method in several previous columns. One important side effect — Fagan would call it a major objective, I think — is the educational effect.

You are often exposed to other specifications and programs than those you have created. You have to learn from both the good and the bad.

Your job as an inspection participant is to compare documentation against standards. Consequently you

are exposed to company programming and documentation standards in a more effective way than most of us are otherwise.

The nice thing about inspections is that, as opposed to courses, they have no direct cost, such as course and travel fees, and no lost time from productive work.

Inspections contribute directly to current projects and they result in directly measurable net human productivity savings. Now that's a really interesting form of training from a cost-effectiveness point of view.

I often feel that one reason computer professionals are so poor at learning, even when sent on many courses, is the lack of motivation. They are not given the right kind of motivation to push them to grasp techniques and ideas which would improve their productivity and effectiveness.

I believe that this failing is directly related to the widespread practice of not specifying clear, measurable objectives for the dozen-or-so quality and cost areas of projects.

This failing is coupled with a corresponding failing actually to measure the resulting costs and

qualities of products and projects.

I believe (and my belief is supported in some detail by earlier columns and my own writings) that a much stronger development culture will automatically foster a more productive learning environment.

We would be aware of system quality areas which were weak in, and would systematically seek out how to improve our performance.

In my last column, I taught the concept of a hobby computer company library for the use of software for interested employees. I think offers a useful and practical supplement to the traditional oriented technology activity that other people thought was time-wasting.

Playing around is a learning and, within the needs to be encouraged. Training managers might try getting a budget of play for certain people and for computer time if necessary.

FOCUS

Buying your kit off the shelf

CHOOSING and selecting computing systems has never been easy. The equipment marketplace is a veritable minefield, one where one false step could inflict serious damage not only on your health, but on the installation.

Increasingly suppliers are advertising their products as being in the instant access mode, with "off-the-shelf" and "ready-for-use" being typical sales slogans. For the unsuspecting purchaser, it is quickly discovered that accommodating the new system on a convenient shelf and switching on is far from the end of the exercise.

For a start, shelves are not recommended locations, while "ready-for-use" in computing terms has different connotations than when purchasing a can of

beans or supper from a Chinese take-away. Similarly claims such as "the system presents a compact answer" or "offers an overall solution" are in many cases suspect, the solution often turning out to be a particularly sticky one.

Miracle cures in computing are notably thin on the ground, or shelf. Dr Hook and his medicine show may well have been able to peddle cure-all pills back in California, but his present-day counterparts in Silicon Valley are unlikely to meet such universal acclaim.

The all-purpose machine, like the car, has yet to be designed. Likewise, no single machine can offer a complete computing facility. This view was emphasised by Colin Smith, secretary of the Central London IDPM.

Talking at a branch meeting, he asserted that there was no such animal as a general purpose computer.

Like the beat hi-fi, a computer system is made up of a series of boxes: the processor, backing stores and peripherals. In future installations will consist of a series of boxes linked to a central facility.

Smith dismissed fears that large-scale computers are threatened with an early demise. With the cost of technology coming down and workloads increasing, the cost savings available to large machine users are considerable.

Naturally not all agree that big is best. Consultant David Scott, speaking at the same meeting, suggested that with over 40,000 potential business users in the UK alone, the demand for basic, all-purpose

computers, particularly those which incorporate office interface routines such as word processing or spreadsheet capability, will increase at a healthy rate.

Time and industry statistics will no doubt tell, but in the meantime the industry is facing a new development. Having been busy concentrating on producing machines for oil purposes, one manufacturer has now announced a system from all machines. Magnuson is marketing what it calls the total OEM concept.

The first UK customer for Magnuson, CAP-CPP (CW, March 13), has acquired an IBM-compatible configuration

which includes a Magnuson processor, Storage Technology and CDC storage peripheral, BASF disc packs, Rascal tapes and Raytheon VDU's. The system is to be completely left out, providing the card reader.

This universal computer approach is fine for those who like to have the best of all worlds can provide. They can also, as a fringe benefit, be much of the real world.

User groups are holding their annual meetings in detectable parts of the world. A Magnuson customer will qualify for automatic membership of at least half a dozen user groups.

'Develop office systems plans now or you'll be out of date'

BUSINESS firms need to develop strategies right away for future use of office systems, so as not to find themselves in two years with a large assortment of equipment that cannot be integrated. This is the main warning to come out of the text processing study carried out by CSA firms for the Department of Industry, the report on which is to be published shortly (CW, January 3, 1980, and March 1, 1979).

In their close look at the information handling practices of 10 organisations in the public and private sectors, the researchers found that word processing equipment was being brought in piecemeal in many different parts of organisations, and the capital tied up in this within two years could be sizeable.

All this could be lost when the time comes to introduce an integrated system with electronic mail and so forth. If equipment were not purchased now with a view to future compatibility.

In the 10 organisations, which included Royal London Mutual Insurance, BL Cars, Citibank UK, and the Paymaster General's Office, use of text processing was limited before the study started. Only four of the 10 had screen word processors, but use is now growing quickly.

All the study group's recommendations have been accepted by the clients.

Looking at conventional activities in the client bodies, the researchers found that 75% of mail in the large organisations originated internally, that more than half of typing work came from handwritten originals, that most mail received was filed



Diane Duggan

away, and that more mail was copied than thrown away.

These findings have important implications for filing systems, copying and dictation, and show that workstations for use by professional staff will be very important.

The organisations that had already done most in text processing were in the best position to do more, said Diane Duggan of Logica, technical leader of the project. This meant that not all the obvious cost-justifiable applications for word processing had already been taken up, she said, and that the gaining of experience by staff was of great significance.

There were few findings on the specific choice of equipment which machine is best — and the group made no attempt to recommend on standards. Standards would have to wait for another project.

The consortium of CSA companies is planning to continue working together on further projects, and is negotiating for a major contract with the EEC.

Olivetti launches screen word processor

OLIVETTI has introduced a screen word processor to add to its range of hard-copy and single-line display machines. The Model 621 has a white-on-black screen and is a stand-alone unit to which communications facilities will be added in about four months.

Included in the price of £2,950 is an Olivetti-made daisy wheel printer and twin double density floppy disc drives. The communications link will allow connection to a 10-megabyte hard disc which is capable of serving up to eight 621s.

Expected by the end of the year is a lower cost model called the 801 which will have mini-floppy discs and smaller memory. This will also be available as just a screen and keyboard for use as a low-cost terminal with a hard-disc system.

The 621 is page-oriented (up to 90 lines per page) but automatic repagination is available. Documents to be edited are collated up by specifying document and page numbers.

An IBM 2780 protocol will be part of the communications facility, allowing links to mainframes.

APL FINDS ITS APLOMB

ECCEVIR takes single handed action on the computer use of APL growth and associated structures. The language processor, named APLOMB, is a new addition to the APL family, which includes the well-known APL, APL/360, APL/11, and APL/11/2. APLOMB is a new language processor, which is a must for non-IBM users.

For most of the control structures (IF, THEN, ELSE, WHILE, DO, FOR, UNTIL, etc.) APLOMB provides a new language processor, which is a must for non-IBM users.

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DRG adds two matrix printers

TWO matrix printers from the Japanese Citizen company have been added to the product portfolio of the OEM division of DRG Business Machines.

Both printers feature a full 98-character set, 256-character buffer, are bidirectional, and feature Centronics-compatible interface with optional RS 232 alternative. The 5700 runs at 120 cps and costs £1,295 in single quantities. The 5800 runs at 180 cps and costs £1,475. Quantity discounts are offered.

The OEM division of DRG also sells Beehive terminals and YE-Delta floppy disc drives. Formed last summer as part of the Dickinson Robinson Group, DRG Business Machines also sells the Cadossystems business computer (CW, June 28, 1979). Both the computer and the OEM products are going round the UK with Computermarket.

Philips joins 'office of future' race

PHILIPS' entry into the race to develop the integrated electronic "office of the future" has now been officially launched, with the unveiling of the new unified organisation, Philips Business Systems. This is an amalgamation of the four Philips UK firms in telephone manufacturing, communications, small computers and office equipment (CW, January 24).

The first product to be launched under the new banner at Comma 80 on April 15, will be the DSX-40 data message switch. This is based on up to five Zilog Z80 microprocessors (CW, July 12 1979).

The UK is the first country in which Philips has set up an integrated office systems organisation, partly because the company's market here is one of its biggest worldwide. Managing director of Philips Business Systems is Brian Manley, who sees the ultimate aim of his firm as "one-stop shopping" for the business customer, but the reorganisation to bring

this about will be slow.

"The customers themselves are not yet ready to respond to an integrated system," he says.

Manley sees the electronic private telephone exchange as the core of the "office of the future"; he calls this the "business switch". Customers are slowly reorganising to be able to use this, and the reorganisation of Philips will also be gradual.

Headquarters of the new firm will be in Maidenhead, with all R&D centralised at Malmesbury, Wiltshire.



MANLEY: "Ultimate aim is one-stop shopping."

In-house market undermined by 'closed' groups

PHILIPS has amended its plans for the viewdata market and is to concentrate for the present on terminals and to continue development of the system software before offering either systems for private in-house viewdata or a service for closed user groups.

Marketing manager Tony Nevison said the euphoria of 18 months ago had given way to the realisation that the market for in-house systems was undermined at the bottom end by closed user groups on public service viewdata and at the top end by viewdata windows into existing databases implemented by their owners.

This left a middle-range market for about 100 to 150 systems a year, but this would best be served by making viewdata software which was compatible with the full range of languages and machines sold by Philips and available on the next generation of equipment.

The closed user group service which was being run experimentally with several potential user companies in London has been run down while preparations are made to launch it on a much larger scale in about a year.

The terminal market is to be attacked on two fronts: high and low volume users. Products have been developed for both editing and user terminals and these are to be pushed vigorously now in concert with the Post Office's efforts.

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Software Ltd

PAGE SIX

for programmers
and analysts

Some satisfaction for graduates in DP

FOLLOWING our request of February 14 for letters from graduates telling of their experience in and reaction to the computer industry, we have had considerable correspondence from graduates who have found some degree of success in the business and, not surprisingly, none at all from those who have experienced any disillusionment.

This is not to suggest that the latter group do not exist but rather that they have not responded to our request.

On the bright side, most graduates speaking after two or three years' experience with a mixture of installations, admitted to enjoying themselves — particularly the responsibility and variety.

Robert Baldoock has been working for the past three years with the management consult-

ancy division of Arthur Andersen. A computer science graduate from Imperial College, London, he found little appeal in becoming a full-time programmer so avoided the software houses and end-users.

After an initial training period of four weeks which covered accounting and business fundamentals, he was sent to a worldwide training school to undergo a three-week intensive programming course, which was followed by a further course in the US on Cobol. Having completed 14 weeks' training, he was ready to start work.

Since then he has worked in the UK and the US on a variety of projects with banks, insurance companies and manufacturers.

The projects Baldoock covered have given him experience of programming, systems testing, systems analysis, design of pro-

gramming standards and he also conducted a review of the DP industry for an insurance broking company.

"I think the most interesting aspect of a career in DP," he says, "is the opportunity to work with people since, contrary to what many think, we do not spend all our time with computers."

"I personally derive great satisfaction from seeing a computer system develop from the early discussions with the user through to detailed design and finally, live operation."

"I would hope that our profession appeals not only to those who are unable to find employment in the field of their choice but in time to become an automatic career choice for those bright and aspiring undergraduates in their final year of college," he added.

'Any degree is suitable for computing career'

JOHN COMPTON of St Albans tells quite a different story from Robert Baldoock although his conclusions are not altogether dissimilar. He graduated in mathematics in 1948 and then spent 20 years as a missionary in Uganda and the Sudan.

It was not until his final year in the Sudan that he became interested in programming and attended a series of evening lectures at Khartoum University. On his return to the UK he decided to look for a programming job.

Compton agrees that a degree,

in any discipline, is a suitable qualification for a career in computing as a good degree course should teach students how to find information; how to select what is relevant; how to think logically about that information and how to express clearly the results of that thinking.

"These steps are obviously also those of analysis and programming," he continues, "though the programmer has to convert the final step into machine readable language rather than an examiner readable language."

Are company perks now getting out of control?

IN recent years it has become quite acceptable in most professions for employees to enjoy not only competitive salaries but also additional perks such as expenses, shopping concessions, and even holidays.

But, to most people, the ultimate perk which many professionals do not enjoy is the company car.

Those working as programmers and DP managers have little cause to stir from the security of their own desk, so it is nonsensical that they should be provided with a car to travel to and from work.

The case for cars, however, goes much deeper and is often an incentive to attract highly qualified staff to a position which may not otherwise be able to keep them in the style in which they have become accustomed.

The provision of a company car is no longer a matter of necessity; for salesmen or reps it is a matter of convention if a company is to be an attractive employer.

Last year, the Computer Users Year Book revealed that 27.9% of chief systems analysts, 17.0% of chief analysts/programmers, and 12.5% of all chief programmers have company cars.

Not impressive figures, but when you take into account that most of the major manufacturers give cars only to salesmen or the higher echelons of management, then the employees of small software houses and companies are more likely to enjoy this sort of benefit, mainly because they have a wider variety of work to do.

However, the British Institute of Management last year conducted a survey which concluded that larger companies in the UK are providing a wider range of benefits, including food, drink, tobacco, publishing, medical care, horse racing, use of company yachts, club and hotel discounts.

To the average programmer/analyst, this does not mean much. ICL union representatives of ASTMS have recently been intensifying their argument for company cars, an issue which has been debated over the past four or five years.

As things stand at the mo-

Blank reply

THE difficulties of writing that a page has been left blank on purpose have caused problems for CW readers since Sheldrick first introduced the situation (Page 56, 10/1).

By far the best solution have received came from a year-old Jonathan Clark, Cults in Scotland. He should write THE NEXT IS LEFT BLANK ON PURPOSE on the page before.

Can anyone better that?

by Judith Morris

SOFTWARE FILE

Level 6 picked for high level executive

A HIGH level operating system developed by Richard Pick in the US is to spearhead a new system called Ultimate, soon to be launched in the UK by Universal Computers and backed by Honeywell.

The operating system is the culmination of 14 years' work and has won itself a high reputation in the minicomputer field. Its reliability and adaptability have led to its being adopted by several firms including Microdata, for the Reality series, and Automatic Data Processing for the Hewlett-Packard 3000.

The Ultimate system is composed of Honeywell hardware, using the Level 6/43 and 6/53 and all its associated peripherals and support systems.

The Level 6 hardware was chosen from among several choices for the operating system, after Ultimate Corp fell out with Microdata in the US.

Pick's system makes Ultimate a competitive runner in a field not covered by Honeywell's own range. The relationship started in the US, where Ultimate has already taken off with success, and is indicative of an increasing trend to sell machines on the strength of software reliability.

The system has a high reputation for its speed and file-handling capabilities, and the use it makes of firmware techniques to maximise the core storage available to users.

It also provides a data retrieval facility which allows fairly sophisticated use of English-like phrases to query files, comparable to the mainframe facility provided by Cullinane's Online English, and is generally "user friendly".

Reports can be generated and adapted without damaging fast response and running times, due to the system's file and data handling techniques.

In the UK, Universal Computers plans to build up a library of software applications for the system so that, acting as a

clearing house for customers, the needs of particular sectors can be catered for by specialised software houses.

The software-oriented approach has already paid off and Ultimate has won two City users through Consultants (Computer and Financial); Eggar Forester the shipbroker (Software File, March 8) and Sellmann Rayner and Co, stockbrokers and option-dealers, which has just bought the system for £14,000 to run the consultancy's Fiscal stock-broking and accounting facility.

Cut-price offers from Data General for CS users

COINCIDING with the recent addition of the CS/50 to its Commercial System family (CW, February 14), Data General is offering two of its new software packages for the small business user at two-thirds of their normal price.

The Cobol generator for developing application programs, First, is on offer at £2,608, and the menu system Master is to cost £978 during the introductory period.

Data General claims that the products can achieve a considerable reduction in programmer time.

Also available is Jobs, a job-stream control which can process a batch queue unattended outside working hours.

Multi-terminal support

A VERSION of Perkin-Elmer's OS/32 and multi-terminal software to support the 7/32, 8/32, 3220 and Model 3240 is available. The OS now supports up to 16 megabytes of memory, and OS/32 includes the basic telecommunication support previously provided by the terminal

APL user group plans register of consultants

THE APL user group plans to form a register of consultants who can offer advice to prospective users in the rapidly expanding APL marketplace.

"Our main purpose is to swap information on APL and market prospects. We are worried about contracts going to 'cowboys' whose inexperience will give APL a bad name," explained Valeria Lumore, editor of the user group's newsletter. She can be contacted on Arlington (022 020) 530.

The APL specialist consultancy Cocking and Orury has launched a data management package for IBM users and a production and purchasing planning system, Adapte OLS.

The firm claims that the management package DMARS, originally developed by Turner and Newell as an alternative to IBM's ADRS, can cut CPU usage by a factor of 20%. The production system Adapte aims to solve the problem of meeting delivery schedules at optimum cost and helps plan efficient use of resources.

BCPL business system is on way

A COMPREHENSIVE business system written in BCPL is under development at the Cambridge systems house Toltec Data to be sold alongside the DataRing communications system and the portable operating system Trout.

Trout and the high speed DataRing were both developed by Toltec out of the products of Cambridge University research projects: Tripos, a portable minicomputer operating system, and the "data ring" of communications stations that could connect different processors together, hailed at the time as a significant step towards machine independent distributed processing (CW, March 15, 1979).

Having put DataRing into printed circuit form and developed Tripos into a commercially supported operating system sold under the name Trout, Toltec has turned its attention away from purely industrial and scientific computing and is seeking to exploit the commercial possibilities of its products.

Backed by a large car dealer with European manufacturing connections, the company is developing the Goosie business system. The BCPL language provides portability, an important selling point for the system, which can be built up module by module, according to the user's individual needs.

Trout already runs on Computer Automation, Digital Equipment and Data General minis, and Toltec claims the

implementation on any machine can take less than three months. Goosie runs on hardware in the 80-mega byte size range, perhaps costing less than £20,000. The software costs depend on the user's requirements since the system is designed to be tailored and extended according to needs, but basic modules are available at a "build-on" price of about £2,000.

Talk on copyright

THE new specialist group of the British Computer Society is to be addressed by computer law specialist Alistair Kelman on "Copyright and computer programs: a new approach" at its next meeting on April 18 at 5 pm at the Olivet Room, BCS, 13 Mansfield Street, London, W1.

Boost for users of Pascal

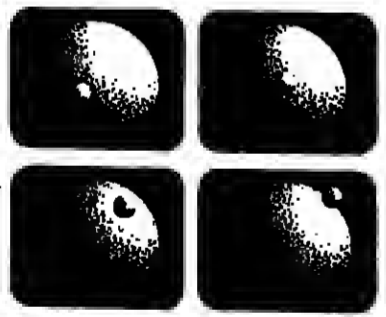
A COMPANY committed to bringing the advantages of Pascal programming language to the small to medium-sized customer has been formed at Twickenham, Middlesex, 21st Computer Systems is awaiting Version 2 of the Australian Atomic Energy Commission Compiler, Pascal 8000, in order to introduce an IBM Pascal service, and is meanwhile concentrating on education in telecommunications and the use of Pascal.



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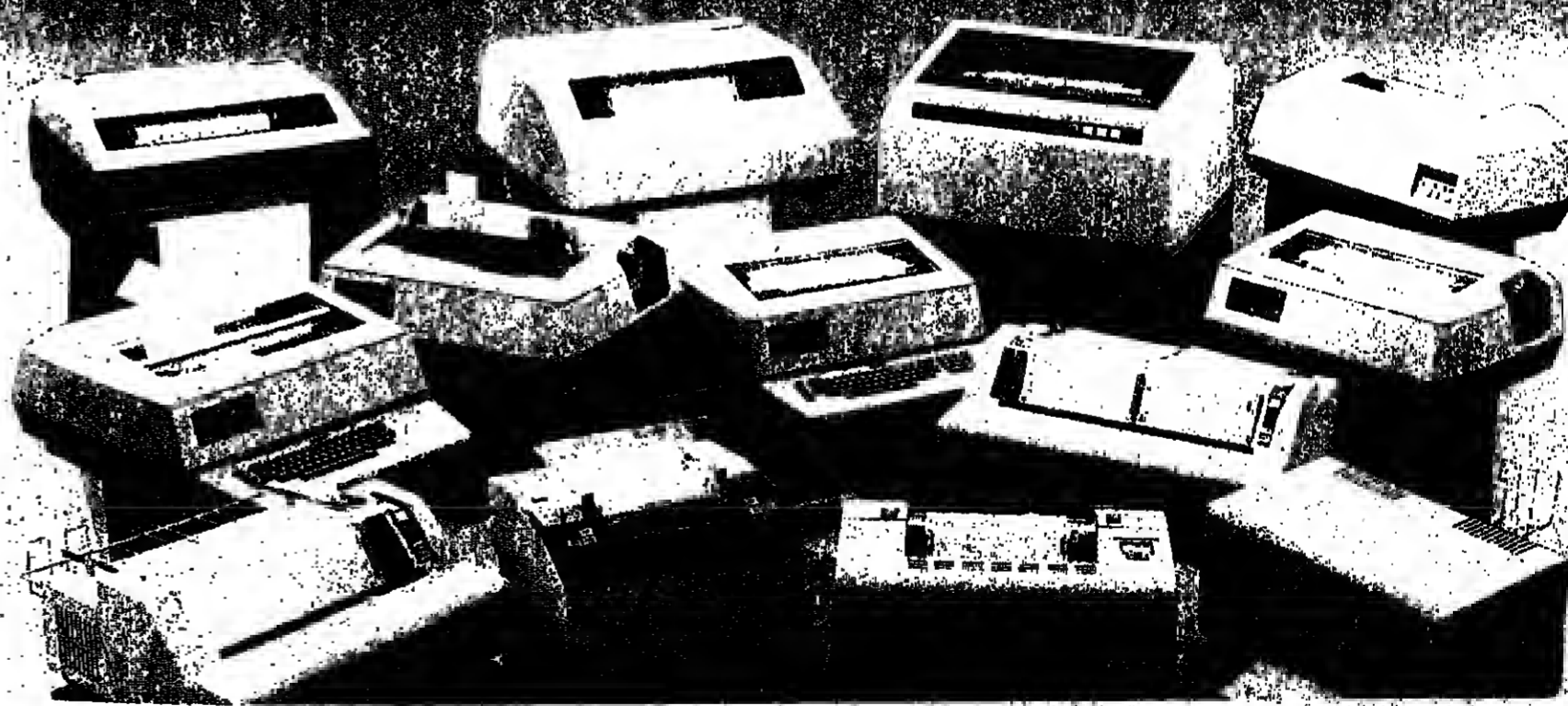
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Puzzler

A PERFECT number is one which equals the sum of its own divisors. The smallest such number is 6 (its divisors 1, 2 and 3, add up to 6). The next highest 28 (1, 2, 4, 7, 14, and 28). What is the next perfect number? See page 53 for solution!

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OP SPOT

How Threshold men sort operators from programmers

THE typical operator has a strong and outgoing personality and is therefore able to get on with his colleagues and other staff at the installation.

Programming, on the other hand, calls for a different type of person, and related attributes. The programmer must have an eye for detail, be ever-willing to ask questions and have the confidence and ability to work on his own.

Such are the considered views of Jack Bell, who is responsible for the personnel and industry placement side of the National Computing Centre Threshold courses held at St Helens College of Technology, Merseyside.

And very important views they are too, for it is on those and certain other criteria that Bell and course lecturer David Fletcher decide which of the students will make the best programmers and which are more suited to operations.

A former programmer, analyst and DP manager, Bell told me, "We have found that one sort of person makes a good programmer, while another sort makes a good operator."

"The operator is an extrovert, the type who is ever willing to take his jacket off and join in a game of football. The programmer, on the other hand, is more of an introvert — he's likely to be a bit less boisterous."

Don't be misled by the simplicity of Bell's explanation. The students' progress is charted throughout the course and they have to take weekly tests and full-scale examinations.

The division process has proved very successful since NCC Threshold courses were first held at the college four years ago. This is to the extent that over 70% of the students have found jobs in the high unemployment Merseyside area.

Under the direction of the NCC, the college views the students first as potential programmers. These who are reckoned not up to standard are then considered for operations.

Said Bell, "First of all we look to see if the student has the makings of a good programmer. That's the way the NCC likes it, but it used to be the other way round."

"But we are determined not to lower the standard of the programmer we turn out. That wouldn't be fair to the companies they find work with."

The current course is the first of its kind. It is being run under the Threshold scheme but is based on the Business Education Council and Technical Education Council's National Certificate syllabus (Op Spot, October 18, 1979).

The course is 42 weeks long and includes modules on basic concepts, people and communications, Basic and Cobol, as well as practical operating.

The module on people and communications is particularly valuable as it teaches the students, most of whom are between 16 and 20, something about the world of business and dealing with people.

It covers writing for jobs, attending interviews, and generally improving their ability to communicate in the verbal and written form.

Said Bell, "The students are young, and don't have much experience of dealing with people, so this part of the course is quite useful."

There are two industry placement periods. The first takes place after nine weeks into the operations department.

This gives all the students, regardless of whether they become operators or programmers, experience of working in the operations department. (It has often been said, in this column and elsewhere, that ex-operators make the best programmers.)

Bell went on, "Most of the sites are very helpful to us. They are only too willing to cooperate."

"It benefits them as well as us, though. The scheme is a shop window for the students here. It's a real opportunity for sites looking for staff."

And so it is after nine weeks at the college that the students go to work in the demanding and often hectic operations environment.

In many cases they become part of a shift team and so have to adjust to the rigours of shift work — a practice Bell fully agrees with.

He explained, "Too often kids become operators without having a clue what to expect regarding shift work. With our scheme they know what to expect at the outset."

"I see our course as a means of helping them find out if they like working with computers. Most seem to."

"We had 25 students at the beginning of the course and just four have dropped out. One is already an operator, another is a clerk, and yet another joined the Military Police. One of the girls decided she just didn't like the work."

When placing the students for the practical part of the course, Bell is careful not to select sites too near to the students' homes.

He explained, "It's another way of helping them learn what working life is all about. It does them good to have to get up early to catch a bus to work."

The period out in the industry is followed by two modules back at the college using Cobol. How the students' fare in these modules, and how they performed with Basic earlier in the course, helps Fletcher and Bell

sort out the operators and programmers.

Said Fletcher, "They do three weeks of Cobol and are then asked if they would like to study the language at a greater depth. They also do some Basic programming quite early in the course and that helps us sort them out."

At the time I visited the college the split of the current course into operators and programmers was fast approaching. Of the 21 students, Fletcher reckoned that nine would become programmers and the remainder would go into operations.

That's a higher percentage than we usually get. It's usually about 25% who go on to be programmers."

Two of the students who, under the guidance of Bell and Fletcher, had already decided on a career in operations, were John Thompson and John Gregor.

Thompson, 16, who hails from St Helens, Merseyside, told me, "I spent my eight weeks operating an ICL 2904 and found it all a bit strange at first. But operating gets easier if you work at it."

Formerly an engineering apprentice, Gregor told me, "I came on the course because computing is the thing of the future and the pay seems to be good."

Gregor spent eight weeks at Haywood and Partners in Liverpool, where he operated an ICL 2904, on an eight-hour, three-shift system.

He said, "It's a bit odd at first, but once you get used to the work it's not too hard. The shift work didn't bother me at all. In fact, I quite enjoyed it."

For their remaining six weeks at the college Thompson and Gregor and the rest of the



THOMPSON... "I found it all a bit strange at first."



BELL... "The operator is an extrovert, the programmer an introvert."



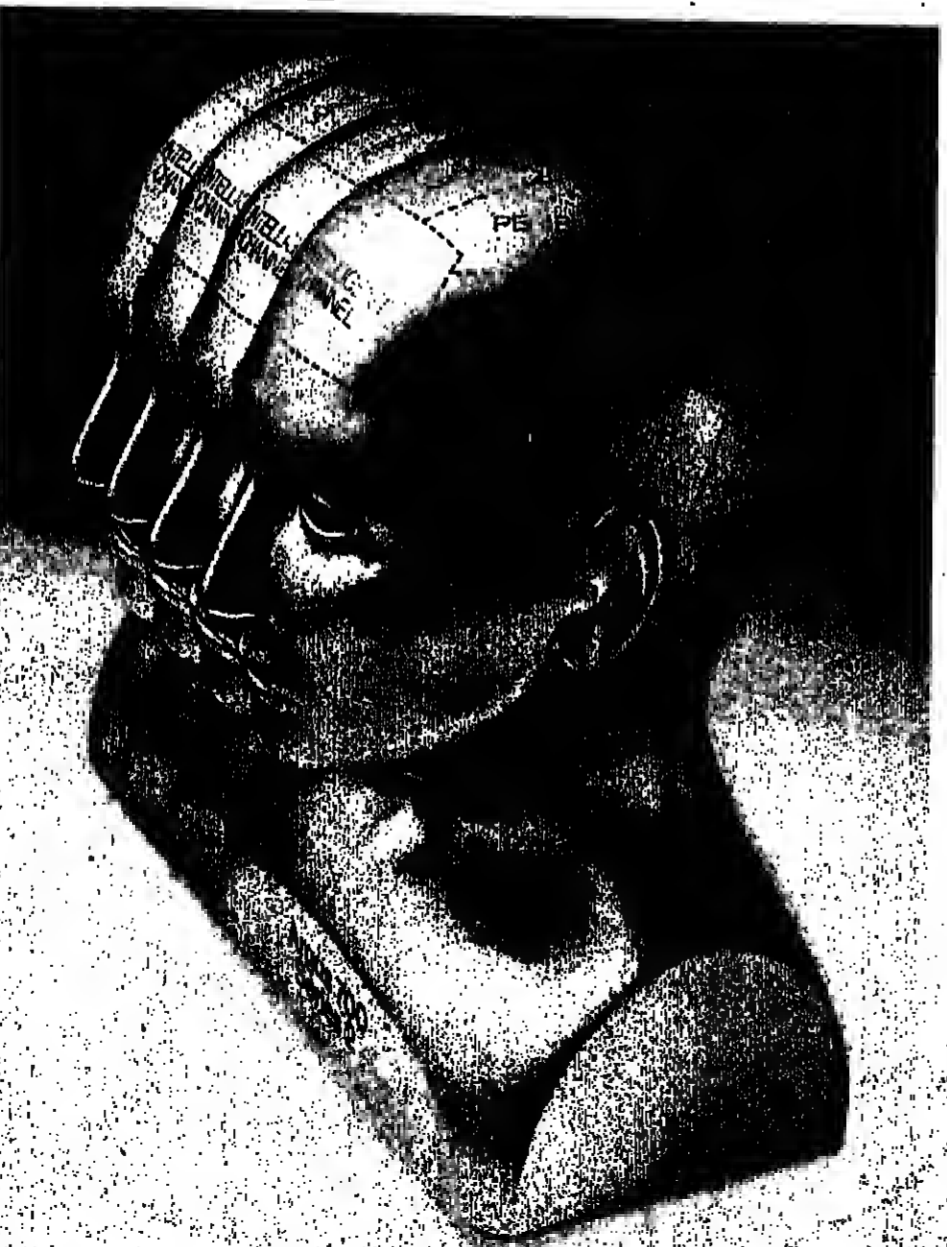
GREGOR... "Computing is a thing of the future."



FLETCHER... "Basic programming helps us sort them out."

by Bernard Allen

Now. Argus 700 Series 2. Multipower, multispeed, multichoice Multiprocessor.



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Demand for computer training of senior civil servants

TOP civil servants have not been adequately trained to make decisions involving computers and to deal with computer specialists, according to a director at the Civil Service College. Writing in the magazine Management Services in Government, Derek Croisdale adds to this, "A disturbing fact is that there is apparently no perceived need by top civil servants for any more training."

Croisdale asserts that "Computers are too dangerous to be left in the hands of the specialists." He goes on, "In the future a growing number of senior administrators will find themselves, at Under-secretary level, with the responsibility for making major decisions affecting complex computer-assisted systems. Most will be ill-equipped to discharge this responsibility because their career development will not have provided them with the necessary experience and training."

The course which administrative trainees take at the Civil Service College includes nothing about computers. Croisdale points out, yet about one-fifth of the 750 civil servants at the higher levels have responsibility for major computer systems and so should have significant computer knowledge.

Croisdale continues, "The whole task of harnessing technology and people is unscientific and the best we can hope for in the task of improving administrative and executive systems is to move to somewhat better positions from worse. This is why this task cannot be left to computer specialists."

Croisdale recommends the introduction of substantial amounts of formal training in computer technology and the design of information systems.

Croisdale continues, "The whole task of harnessing technology and people is unscientific and the best we can hope for in the task of improving administrative and executive systems is to move to somewhat better positions from worse. This is why this task cannot be left to computer specialists."

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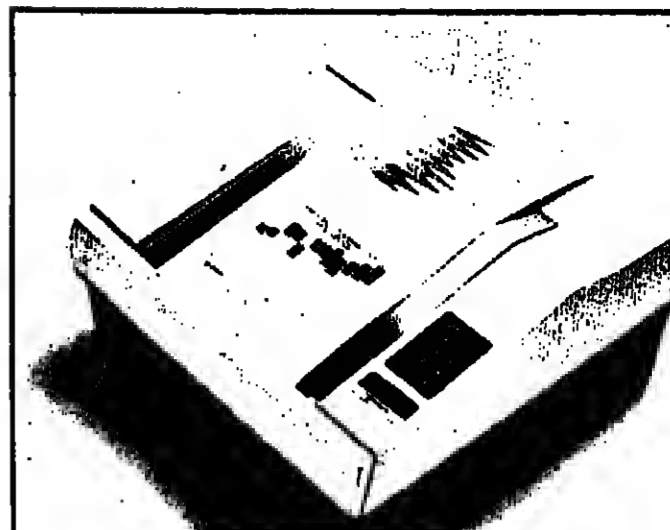
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Versatec's V-80 electrostatic printer/plotter prints 1,000 lines per minute with 200-dots-per-inch resolution. It plots an 11 x 8.5 inch page in seven seconds.

1,000-lpm printer for £4,750

VERSATEC, the world's leading manufacturer of electrostatic printer plotters, has launched the V-80, a dash-top unit that can print 132-column lines of alphanumeric data at 1,000 lpm while costing no more than £4,750 to end users.

Hard copy printing of alphanumeric and graphics data from the expanding population of commercial VDUs with graphics capability is seen as a big application area for the V-80.

The V-80 is also the first electrostatic printer to be sold by Versatec on an OEM basis. OEM prices start at £2,700 and can be as low as £1,600 for big volumes.

ICL is one of several UK-based computer systems suppliers now sampling the V-80. The V-80 is at least 35% cheaper than the existing Versatec 11-inch electrostatic printer, the floor-standing 1200A. Cost savings have been made by replacing bulky electronics like wiring and transformers with LSI components. But the printing technology employed by the V-80 is basically the same as on the 1200A. It still requires liquid toner and carbon concentrates to create an image after electrostatic dots have been formed on the special paper by a row of wiring tips to which a voltage has been applied selectively under software control.

The V-80 provides a resolution of 200 dots per inch and forms characters from a 14 x 18 matrix. A variety of ROM-based character sets can be used and Versatec points out that the speed of the V-80 when printing characters is always 1,000 lpm regardless of the character set. The monitor of characters per line

PEOPLE and EVENTS



Wall
George Wall has become CMC's branch support manager for the North West Home Counties. He was previously a technical consultant with Computer Automation.

Musson
Sean Bedford, former Collector General of Taxes, has joined Insight Management and Personnel Consultants as a senior consultant for special projects. IMPC was formed by ex-Honeywell chief executive Pat Rafter in 1977.

Bedford
Bob Musson has joined Inter-City computer bureau as sales director. He was previously group systems manager with the Frederick Parker group after six years spent in marketing with IBM.

Politt
Mike Politt has been appointed sales director of Venet Computers after 20 years with ICL. He was until recently sector accounts director with ICL's national accounts sector.

Telecom director for CAP Sogeti software

ONE of the two main French operating companies of the CAP Gemini Sogeti group, CAP Sogeti Logiciel, has recruited a senior director to lead its telecommunications division. Rémi Deprés has played a leading role in the International Standards Organisation. After undertaking research into

packet switching networks for the Directorate of Telecommunications he was made responsible for the specifications and implementation of the national Transpac network at the Television and Telecommunication research centre which is located at Rennes, in Brittany.

Dwight Olson has joined Megatek as product manager. He was previously with MAR where he was part-owner and director of the company.

Ken Smith has become product marketing manager of discrete products with Ferranti Electronics.

Clive Day has joined the Datasab sales team as an agency sales executive. He was formerly marketing manager with S&C Computing.

Patrick Gouldney has been appointed director of client services with UCC. He was formerly director of UCC Nederland NV in The Hague. Last year he returned to England and has been restructuring the Norbury centre.

Paul Robertson has been appointed to the new position of marketing executive with Wilcox Computers. He was previously with the Sankey group of companies in sales promotion and advertising.

Ed Skulski has become a senior sales engineer with National Semiconductor, based at the company's UK sales office in Bedford. He was formerly with Texas Instruments.

Elfi Bayrd has become international support supervisor for the computer products division of Nashua Corp. She was previously international administration manager for the company.

John Cooper has become director of marketing with NEC Information Systems. He was previously director of product marketing at Nixdorf.



Chess protégé Nigel Short, who recently qualified as an international master during the ICL Hastings International Chess Congress, is introduced to ICL computers by one of the company's marketing managers David Nicholson.

Nigel, at 14 Britain's youngest international master, was presented with a gold clock during a visit to ICL's Marketing office to commemorate his success at Hastings. Also in our picture is Nigel's mother.

ITT names two vice-presidents

ITT has announced the appointment of Merlyn Alper and John Sexton as vice-presidents of the company.

Alper is to continue as vice-president and controller of ITT Europe. In 1978 he was general auditor of ITT.

Sexton is vice-president of operations management for ITT Europe. He is the company's semiconductor division in 1980 and later several posts with ITT America.

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AUSTRALIA DB/DC Support Staff up to DLRSA 23,000 P.A. plus benefits.

The Bank of New South Wales, Australia's largest commercial bank and one of the largest IBM users in Australia, is seeking experienced DB/DC support staff for its technical support group located in Sydney. The bank is currently committed to IMS based data base and data communications development on a large scale.

Duties

Participate as a member of the DB/DC group in supporting the development, maintenance and operation of new and existing systems using IMS/VS data base and data communications, and the Lexicon Data Dictionary. Responsibilities include data base design, IMS/DC tuning and performance, data base recovery design and general problem solving.

Experience

1-2 years experience in IMS/VS DB or DC and experience with any of the following will be considered favourably.
• IBM equipment with OS/VS • IBM 3600
• Olivetti TC800 • Application Development Technical Control
• Systems programming.

Hardware

One 14MB IBM 3033/MP plus 4MB 370/15B situated in Sydney. Two 3MB IBM 370/15B and five 370/145 situated in other states using 3705 communication controllers and other peripheral equipment supporting a network of 3600 finance terminals in its first stages of implementation, as well as an extensive range of batch and on-line systems.

Software

The bank has installed MVS, VSI, TSO, VTAM/NCP, IMS/DB/DC and expects to remain in the forefront of SNA Development in Australia.

Conditions

Air fares and relocation expenses for your family will be met by the bank and up to three months' subsidised transit housing can be available. These are long term career positions.

The Jobs

A range of positions is available requiring different levels and types of expertise, while extensive training opportunities are available, some degree of expertise in any of the above software fields is essential.

Benefits

Four weeks annual leave with pay loading
Superannuation
Housing finance available in line with bank's current lending policy applying to specialist staff.

Applications

Please apply in writing to
Brian Bussell, Care of Business Development Officer,
Bank of New South Wales, 29 Threadneedle Street, London EC2R8BA.

Arrangements will be made to interview selected applicants in late April.

Bank of New South Wales
(Incorporated in Australia with limited liability)



TIM PALMER LOOKS AT ICL's REPLACEMENT FOR THE 2903

Versatility at low cost

KEEPING pace with the march of technology, ICL's new ME29 series offers hardware which can be installed in an office environment, software which offers extended networking facilities, a choice of hierarchical or simple relational database, enhanced flexibility of use, and Prestel-compatible viewdata software — all for 60% of the cost of a comparable 2903 system.

The new processor is a 32-bit word machine, which for the ME29 is microcoded to emulate the 24-bit word of the 2903 series. The full 2903 series instruction set is included, but has been extended with additional instructions. It is built around a data highway much faster than that on the 2903 series, so that ICL claims up to five times the input-output data transfer capacity of the 2904 on the smaller ME29/35 model.

Mainstore is now created as a peripheral on the data highway, and a reliability innovation is the incorporation of a single-board diagnostic processor driven by an Intel 8080 micro. This enables the user to go through basic diagnostic routines, and telephone the results to an engineer who should then be able to advise on a remedy or call with the appropriate board for replacement.

The microcode instruction rate is 3 million per second, but the processor speed is about the same as that of the 2904. The ME29/45 model offers about 80% more power and is offered as a field-upgrade. This is achieved in the same way that a 2903 is turned into a 2904 — by adding a single board which replaces microcoded instruction pre-fetch with hardware pre-fetch.

The processor is built in TTL

and uses 16K-bit memory chips. Main memory ranges from 64K to 256K-words, though ICL has decided to talk in terms of bytes for the ME29, giving 256K to 1 megabyte.

In competitive terms, ICL says that the ME29 covers the power range of the IBM System 34 through the System 38 to just above the IBM 4331. ICL claims that at each level the ME29 is priced a little lower than its IBM

counterpart. Clear marketing advantage over the most obvious competitor, System 38, is that ICL says first shipments will be in July, two or three months before IBM can deliver System 38. The ME29 offers a simple relational database as an alternative to the Codasyl IDMS, and features Cobol, RPG II, Fortran, Basic and Algol against only RPG III on the System 38.

A wide range of the new disc drives is offered with the ME29, but if users want to transfer their EDS 60s, they will continue to need a full sir-conditioned environment. The other drives range from a 35-megabyte fixed unit through a 60-megabyte exchangeable drive to 120 and 500-megabyte units. The 35-megabyte drive goes on a separate channel, and up to 16 drives can be supported in two

strings for a theoretical maximum of over 16,000 megabytes. A new workstation, substantially the same as that announced with the ICL System Ten 120, can be used for controlling the system as a console display, for direct data entry and for interactive working. Three different terminals were needed on the 2903, and up to 24 of the new workstations, installed only locally, can be supported. Terminals can be moved around his premises by the user.

Base price is £35,000 for an ME29/35 with 256K-bytes of memory, 35-megabyte drive, one floppy disc drive, one workstation and a printer.

New software aims at ease of use

EASE of use is the principal aim of the new software offered with the ME29. It comes with a new operating system, TME, for Transaction Machine Environment, which will run all 2903/4 programs unchanged. However some adaptations will be necessary to these to make full use of the facilities, particularly for teleprocessing, in TME, in particular a change from the 2903 MTS interface. But MTS is also supported.

The ME29 effectively makes obsolete the 2905, but the larger ME29/45 is still just below the 2950/10; it will be possible to run TME on the 2950 and 2956 and the new models planned for the middle of the 2900 series.

Most striking feature on the networking front is the addition of facilities comparable with those offered to terminal computers attached to an IBM SNA network. Users at an ME29 terminal can, for example, run a job on a 2900 mainframe under VME/B. IBM communication

remains standard 3270 simulation. ICL considered turning the ME29 into a full SNA-compatible terminal computer competitive with the 8100, but decided that the size of the market did not yet justify the development effort.

The first fruits of an ICL relational database development project have emerged with ME29 in the form of PDS, Personal Data System. This is a limited personal database designed for use by non-specialists.

It allows, for example, a manager with a workstation in his office to do modelling or for a scientist to do statistical analyses while the machine is currently running the day-to-day workload.

Programmer productivity should be enhanced by Dialog, a facility which enables users to interface direct to the language compilers from a workstation, allowing them to use the screen and text editors to amend the source code. Interaction is via standard forms which can be called up on the display screen.

Among the 2903/4 facilities also offered are concurrent word and data processing using Wordskill and the Wordskill Manager packages, which support electronic mail using the ICL 7700 word processor; full IDMS and the IDMS-E subset; the DDS data dictionary; and the new Range Cobol will be the standard Cobol compiler, for full compatibility with larger 2900 systems.



You can take away LSI-11 micros in your pocket. For the software, you may want a forklift truck.

The LSI-11 family shares the size (13x22 cms) of many micros.

But there the resemblance ends. This is the world's most advanced 16-bit microcomputer. The most advanced in its class.

Why? Because it is the micro systems designer's entry to the Digital Equipment PDP-11 family — the world's leading range of minicomputers.

It uses the same operating systems — RT-11 single-user and RSX-11 multi-user — real-time systems — as all the minicomputers in the PDP-11 family.

So, basing your thinking on LSI-11 micros, you have an assurance of compatibility, of upward extensibility, undreamed of in other micros.

Whatever you write to run on even the lowest-priced LSI-11/2 board can be run thereafter with little or no modification on any of the 100+ computers bearing the -11

suffix, all the way up to the medium-scale multitasking PDP-11/70 computer and Digital's latest big real-time computer, the VAX-11 family (32-bit computers which will also accept 16-bit PDP-11 instructions in a compatibility mode).

And in the LSI-11 family itself there is a wide choice of models. From basic LSI-11/2 models for price-sensitive applications up to the latest and most powerful LSI-11/23... a microcomputer with performance virtually that of a mid-range minicomputer.

You can write in an extended range of high-level languages: among them, a

MACRO assembler, FORTRAN IV, FORTRAN IV-PLUS, BASIC, BASIC-PLUS-2, APL, COBOL, and CORAL.

If you need a communications capability, we offer a broad range of software products which includes DECnet Phase II for networking, 2780 emulation, and multiplexing capability.

You have, currently, 21 models of the LSI-11 family to choose from, plus over a hundred hardware options — plus, of course, all the software. Any LSI-11 can use over 90% of all PDP-11 software. The LSI-11/23 can use virtually 100%.

We can give you any level of service you want in 131 countries. In Europe, there are Product Repair Centres in 14 countries, offering you board return and module mailer services. Or we'll sell you parts to do your own maintenance. Or maintain your product on site.

For more information on our LSI-11 family and its software capabilities, please use the coupon:

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No. 1 in advanced 16-bit microcomputers

MICRO NEWS

Tandy places great store by City centre presence

TO try to counteract the fact that it has remained an also-ran in the UK marketplace, Tandy has started to open a number of specialist microcomputer stores in the UK, with the latest one, in the City of London, opening next week.

Situated in Seacoal Lane EC4, a stone's throw from Ludgate Circus, the company claims the store is the first to appear in the Square Mile.

The store forms part of a large Tandy retail outlet, half of which is given over to selling the company's staple product lines of hi-fi equipment. It does, however, boast a fully equipped training facility on which one- and two-day courses for new users will be held. A total of 12 Model One systems, each of which is switchable between 8K and 16K bytes, is provided.

Both the Model One and the recently launched and soon to be available Model Two versions of the TRS 80 microcomputer system will be on sale in the store, and the company has high hopes of picking up considerable business.

As assistant managing director Alastair MacGillivray pointed out, "The City is recognised as the business centre of the world, and the market potential for business equipment and computers in the area is huge."

According to the company, it is currently selling over £2,500,000 worth of computer equipment a year, and hopes to build this up to £5 million a year. Within three years, it is aiming at sales exceeding £10 million.

Such figures are interesting in the light of current dismal

trends in the microcomputer market in this country. In the US, Tandy is generally acknowledged as the market leader, even though it is reluctant to give detailed figures. Before the end of 1978, however, it was generally being reckoned to have shipped around 200,000 systems of varying types.

In this country, where the market this year should top the £43 million mark for hardware, Tandy's £5 million seems to confirm general industry estimates that the company has around 10% of the market.

Some unofficial estimates state that Tandy is planning to ship in 7,000 Model One systems, and 1,200 Model Two systems this year, which would correspond with MacGillivray's £5 million sales forecast, though

Ted Russell, the UK director of

the Computer Division, said that the company would be importing as many as it could sell.

Tandy is currently claiming some 40% of the UK hobbyist marketplace. But the latter is in turn only about 10% of the total market for micros in this country. According to Russell, only half of what the company sells here goes to this market, with the other half being sales of complete systems for the small business and occupational markets.

This tends to support the suggestion that Tandy has 10% of the UK market.

Pictured right is Vince Moore, manager of the latest Computer Centre, with a "computer take-away" outside his store in Seacoal Lane, London.



Intel Magnetics aims at OEM manufacturers

A BOARD-LEVEL version of its one megabit bubble memory introduced by Intel Magnetics is being aimed directly at OEM systems manufacturers.

Called the ISBC 250, the board interfaces directly with the company's Multibus and has been designed to operate with the other products in Intel's single board computer range.

The board incorporates one 7110 memory device, an 8085A-based memory controller, and standard interface components. Intel sees the board filling the gap that exists in its product range between its SBC RAM boards, and odd-on memory systems such as discs. It offers systems designers 128K bytes of non-volatile memory in a single plug-in unit, together with several other user advantages.

In particular, it has a fast access time than tape or 6-memory systems, typically milliseconds, and is inherently more reliable. This can be important in harsh environments, an applications area the company considers significant for the board.

Two Nascom text packages

TWO versions of a text editor and formatting package have been introduced by Nascom Microcomputers for use with Nascom 1 and 2 microcomputers. Nascom VSI for Nascom 1, and VTI for Nascom 2, are intended for use with 16K of RAM but can be used with 8K with a pointer alteration.

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Engineers warned micros could be 'too easy' way out

by Joe McGool

THERE is a danger that the microprocessor will become a "convenience solution" for the uncreative systems engineer. That was the view of the speakers and audience at a colloquium run by the Institution of Electrical Engineers in London.

The microprocessor was criticised because of its poor performance in some applications, the cost of developing software and the problems of fully testing the device.

Suggestions for alternatives to the microprocessor offered an apparently retrograde step in the direction of hard logic solutions. The alternatives discussed were customised chips, uncommitted logic arrays (ULAs) and programmable logic arrays (PLAs).

Gary Vanstone of Racal Microelectronic Systems mentioned two areas where the microprocessor was perhaps being misapplied: analogue-to-digital conversion and signal processing. The microprocessor was too slow to do a good conversion job and was not capable of the parallel processing that signalling often demanded.

Vanstone was also concerned about the time taken from the specification of a job to its development and prototyping. By using uncommitted logic arrays, he maintained, development turnaround time could be kept down to, typically, between eight and 10 weeks, at a cost of between £2,000 and £10,000. Customised chips took perhaps 12 months' development time at a cost of £50,000.

Practical implementation of ULAs was described by Dr Andrew Hopper of Cambridge University's Computer Laboratory. Because of the necessity for very high speeds on the Cambridge computer ring the microprocessor was thought unsuitable for

some of the applications. ULAs had been used instead on the repeaters and stations around the ring. Micros had been retained for overall control functions and for buffer access.

Dr Hopper explained that his team used the bipolar, Ferranti ULA. This consists of 440 internal cells and 48 peripherals. Each internal cell consists of a number of resistors and transistors. These cells may be joined together by a single metalisation process to perform different functions.

This means that instead of changing the program or software, as is necessary with a microprocessor, the behaviour of the device is changed by altering physical connections. It is a hardware solution.

Programmable logic arrays were described by Jim Proudfoot of the Department of Electrical and Electronic Engineering at University College, Swansea. These devices are very like read-only memories but provide substantial advantages.

The PLA may be programmed in the field, just like the ROM, by blowing out internal fuses. But unlike ROM, those inputs that are not needed may be treated as superfluous again by blowing fuses. This makes programming very simple.

But according to Proudfoot, the PLA did have a couple of disadvantages. Only four or five commercial PLAs were on the market and they cost about £25 each.

There were also few PLA programmers (the equivalent of a PROM programmer), the devices that blow out the appropriate fuses in the PLA package.

All the speakers emphasised that the alternatives to the microprocessor demanded very good design aids. Derrick Roberts, director of research at GEC, spoke of the particular need for good database support. Databases used in computer-

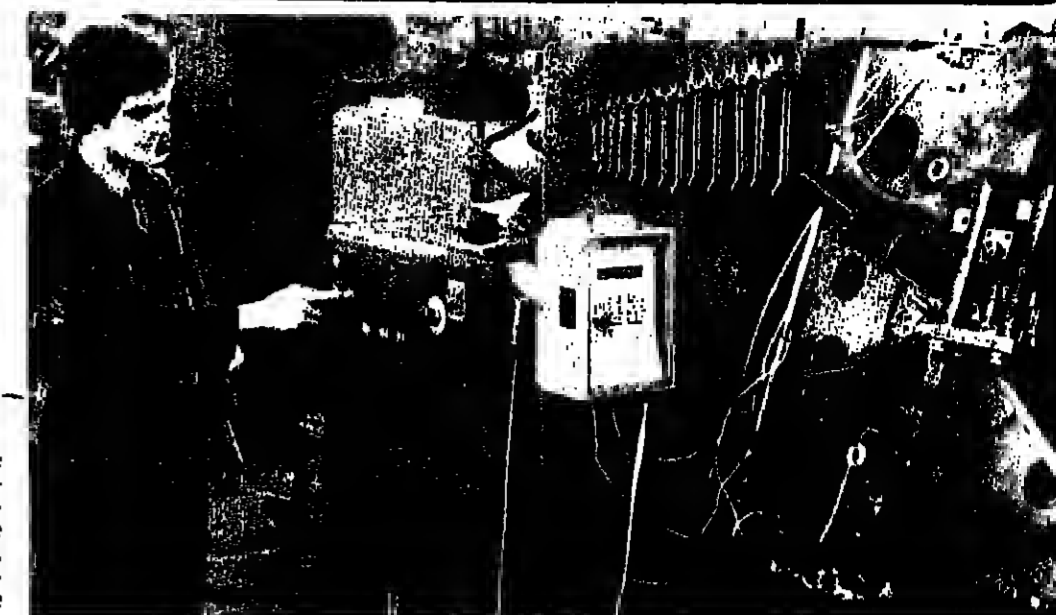
College micro-unit to back research

A MICROPROCESSOR unit is being established at Imperial College, London, to provide technical support to research groups working on industrial applications of micros. A grant of £170,000 from the Wolfson Foundation will maintain the unit for five years. It will consist of three staff and a range of support equipment, such as simulators and logic analysers which cannot be provided at department level.

Assembler support

AN assembler support package has been introduced by Intel for its recently introduced 8088 170-co-processor for the 8086 micro. Designed to run on the Inteltec development system, it consists of an assembler and a set of software development utilities.

by Martin Banks



Protection unit launched by Zeta Dynamics

THOUGH in the long term the microprocessor is certain to become an integrated part of production and manufacturing equipment, this new system from Zeta Dynamics demonstrates one way of approaching the market with an intermediate step. Called the Tool Protection Unit, it has been designed to bolt directly on to a wide

range of machine tool equipment, including automatic presses, drilling and cutting machines.

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JOHN KAVANAGH REPORTS FROM THE LEIPZIG FAIR ON ATTEMPTS TO COPY THE PDP RANGE

Compatibility quest starts to go off rails

AFTER years of copying IBM's 360 and 370 systems the Comecon countries of Eastern Europe have turned their hand to producing computers which are compatible with Digital Equipment's PDP range.

But unlike the IBM-compatible systems, which were produced across the Comecon countries according to a unified plan, the copies of the DEC machines are being developed largely independently by different countries. The result is a

vast difference in technology from one system to the next.

The DEC-compatible systems were on show at this month's Leipzig Fair in East Germany where Poland, Czechoslovakia, Romania and Hungary demonstrated PDP-like machines.

Romania and Hungary have gone their own ways down the DEC road, but there has been some co-ordination of the efforts of Czechoslovakia, the Soviet Union and Poland.

A representative on the Czech

stand said the processors in the new SM range were the SM3-10 and SM4-10 produced by the Soviet Union and the SM3-20 and SM4-20 from Czechoslovakia. He said there was no difference in power between the two SM4 models and between the two SM3 models, but pointed to big differences in technology.

The more advanced processor technology in the Czech models meant the processor on the SM3-20, for example — the equivalent of a DEC PDP-11/20



— was contained on two boards while the Soviet Union's SM3-10 needed up to five boards.

The memory in the Czech version used 16K-bit chips from Mosatek in the US and from Japanese suppliers; the main memory in the Soviet system was core and so took four times the number of card slots.

Finally, the Czech model had a floating-point arithmetic unit which the Soviet system did not have.

The Czech representative said

the SM3-20 ran under the Fobos operating system, which was compatible with DEC's RT-11. The SM4-20 ran under OS RV, which matched RSX-11. Mumps and Fortran were available and Cobol, Basic Plus and Pascal were planned for later this year.

Systema had been installed in Czechoslovakia in process control applications and in educational institutes.

The Soviet Union, which takes a complete hall at the Leipzig Fair and shows off its heavy engineering and space exploration equipment, had its usual low-key computer display; its SM3 was shown instead by Poland, which makes the peripherals under licences from a number of Western companies and also developed real time software for the machine.

A representative confirmed that the memory was core. Poland made the peripherals and the controllers, he said. The cartridge discs were made under licence from Control Data, the printer and floppy disc units under Logabax licences and the display terminals were under licence from Datacube. Production had started in December.

Romania's DEC-compatible machine was called the Coral 4001. The representative on the stand said he had not heard of the Coral language and explained that the system ran Fortran, Cobol and Basic. It was the equivalent of the PDP-11/04 and had up to 64K-bytes of memory.

Another model, the 4011, matched the PDP-11/34 and ran the RT-11 and RSX-11M operating systems. It could have 256K-bytes of memory and a fast 1K cache memory based on Signetics chips.

The Hungarian offerings in the DEC-compatible stakes were the EMU-11, an equivalent of the PDP-11/40, and the TPA-1, which had the PDP-8 instruction set. These systems are produced by the country's Central Research Institute.

Intel's 300 series bit-slice microprocessor formed the heart of the EMU-11 and a spokesman said the 4K memory chips came from Mosatek and others. The EMU-11 was shown with a 5.2-megabyte cartridge disc drive from Bulgaria.

The operating systems, again, were compatible with DEC's RT-11 and RSX-11M and the institute was working on microprograms which would allow the computer to emulate other systems: Hewlett-Packard was mentioned in this context.

Hungary's TPA-11 was built round an Intel microprocessor, had Hungarian-built floppy disc drives and could be programmed in Basic, Fortran and C.

Budavox and the manufacturing organisation connected with it, Orion, consider Hungary the leader in communications. Eastern Europe and, certainly, there were more terminal and other communications products on the Hungarian stands than on any others.

Those products included modems and multiplexers, the modems handling data transfer speeds of between 600 and 1,200 bits per second.

Leipzig Fair is the big show for the Eastern European computer industry, and this year's crowded exhibition hall attracted a strong contingent of Western companies.

sub-set of Cobol.

The second generation of the unified range of IBM-compatible systems took a back seat at this year's show. The largest known working system, the 1655 from the East German organisation Robotron, was there (CW, March 20). It falls between IBM 370/146 and 168. But the Soviet Union's 1080 failed to appear: it was represented only by one of the new 100-megabyte disc drives produced in the Soviet Union and Bulgaria.

A representative on the Soviet stand said none of its drives had been exported, certainly the largest East German user, the government services organisation Kombina Datenverarbeitung, is still restricted to the earlier 20-megabyte units.

Hungary was the only other country to show a machine from the latest unified range, its 1010M is the smallest in the range. The manufacturer and trading organisation, Videoton, said the machine used processor chips from the West and had core and MOS memory from the West and from East Germany.

Videoton expected to sell 300 40 a year for the first two years and already had a showpiece installation in the West, in Austria. The customer was a cargo firm, Interfracht.

Videoton also had on display intelligent terminal systems labelled 52100. These had built-in floppy disc drives "from France and Germany".

Other display terminals, the ADP1500 and ADP-2000, described as compatible with DEC's VT05, were shown by another Hungarian trading organisation, Budavox. This organisation was looking to Western markets for these products, which have been tested successfully with Hewlett-Packard DEC and IBM Series One computers. Budavox said it was looking for marketing co-operation from West German firms for these products.

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Those products included modems and multiplexers, the modems handling data transfer speeds of between 600 and 1,200 bits per second.

Western tie-up wanted

YUGOSLAVIA is looking for a major agreement with a Western computer firm in a bid to build up its computer industry and further co-operation with Eastern Europe. A spokesman of the country's stand said Yugoslavia looked to the West for its computers and had "only a few" systems from Eastern Europe.

He played down the agreements under which Yugoslavia was to build Control Data Cyber

18 and Honeywell Level 6 minicomputers up to 1980 (CW, November 9, 1979) saying these deals were not permanent. "We are looking for a long-term operation with just one company," he said. "It will be a US company and the agreement will be announced later this year. The deal will be very big and will involve a major transfer of technology and microelectronic technology."

COMPANY NEWS

Honeywell chief sees mixed future

A MIXED picture of Honeywell's prospects for 1980 has been painted by Honeywell chief executive Ed Spencer.

He forecasts first quarter profits for the period to March 31 down from last year's \$58.8 million, but goes on to suggest that profits will be ahead of those in 1979 for the full year.

As usual the latest US recession has hit Honeywell Controls, with a downturn in orders for heating and cooling controls as housing starts are cut back. However, this part of the company is now also strong in energy control systems for commercial buildings, which with the high price of oil are increasingly sought after; Spencer

says that orders are well ahead of last year.

Also booming is Honeywell's growing components business, about which the company has made little noise up to now. Honeywell makes specialised chips including on automatic focusing device for cameras, and is increasingly making components for its own use, and is adding two manufacturing plants.

Honeywell's business is becoming increasingly polarised, with the largest and the smallest systems achieving the biggest success.

Spencer reports that the already highly successful minicomputer business is particularly strong, and that orders for the top-end DPS 8 machines launched last autumn are ahead of forecast.

Honeywell expects to gain by more US defence spending but, on the debit side, component margins are being shaved by rising prices for gold and silver. First quarter profits will be hit by higher labour costs.

Wyly settles out of court

THE anti-trust case brought by Wyly Corp against AT&T following the failure of Wyly's Datran subsidiary has been settled out of court. Under the agreement, Wyly gets \$50 million and withdraws its anti-trust suit.

No admission of liability has been made and Wyly will get a

First half profit up 40%

SMALL systems and distributed processing specialist Datapoint has reported first half net profit up 40% at \$15.9 million on turnover up 38% at \$148.2 million compared with the period to January 31, 1979.

The company warns that growth is likely to moderate as the recession bites. Datapoint products are marketed by Ventis in the UK and by TRW subsidiaries and affiliates internationally.

Lockheed sells mini side to consultancy

THE minicomputer manufacturing operation of US plane-maker Lockheed has been sold to Cambridge, Massachusetts consultancy Bolt Beranek & Newman for an undisclosed sum.

Bolt Beranek & Newman is best known outside the US for its pioneering work on packet switching techniques which led to its building the Advanced Research Projects Agency, Arpanet, packet research network. Arpanet links universities and research establishments throughout the US and has connections to Europe.

Last summer, BBN formed a new subsidiary, Bolt Beranek & Newman Computer Corp to manufacture computer products and market them on an OEM basis. Its first product is the Pluribus, a multiprocessor version of the Lockheed Sie minicomputer, designed for high reliability in broad bandwidth message switching applications.

The Pluribus is used as the node processor on Arpanet, which is still maintained and extended by BBN, and is also offered for other public and private sector networks in the US.

The Lockheed Sie mini was also used as the processor in the Lockheed System III, a business system with a chequered career which finally died in October.

The System III was a plug-compatible alternative to the IBM System 3 business computer, launched three years before plug-compatible CPUs became fashionable.

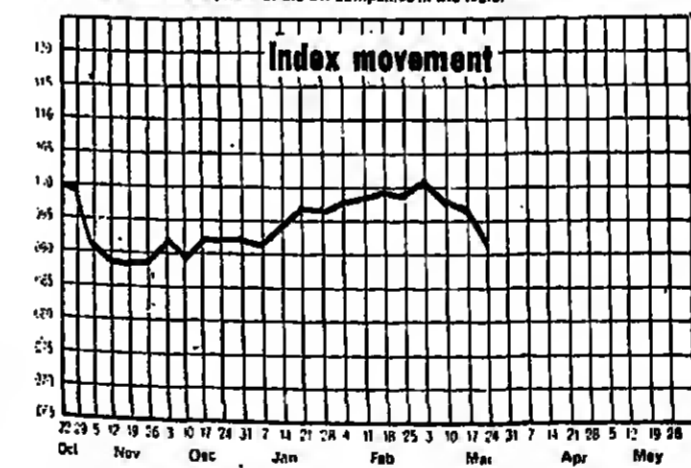
When Lockheed killed the System III last autumn, Tymshare took over support of the US user base.

A BBN spokesman in Cambridge told Computer Weekly that the Sie business had been acquired to assure continuity of supply of processors.

CW SHARES TABLE

LONDON LIST			NEW YORK STOCK EXCHANGE		
High	Low	Change	High	Low	Change
1000	995	+5	1000	995	+5
1001	996	+5	1001	996	+5
1002	997	+5	1002	997	+5
1003	998	+5	1003	998	+5
1004	999	+5	1004	999	+5
1005	1000	+5	1005	1000	+5
1006	1001	+5	1006	1001	+5
1007	1002	+5	1007	1002	+5
1008	1003	+5	1008	1003	+5
1009	1004	+5	1009	1004	+5
1010	1005	+5	1010	1005	+5
1011	1006	+5	1011	1006	+5
1012	1007	+5	1012	1007	+5
1013	1008	+5	1013	1008	+5
1014	1009	+5	1014	1009	+5
1015	1010	+5	1015	1010	+5
1016	1011	+5	1016	1011	+5
1017	1012	+5	1017	1012	+5
1018	1013	+5	1018	1013	+5
1019	1014	+5	1019	1014	+5
1020	1015	+5	1020	1015	+5

The table shows the closing prices in London and New York at the end of last week. The index is based on the prices of the UK companies in the table.



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- WYN PRICE** Responsible for design, implementation, and simulation of networks at the National Physical Laboratory.

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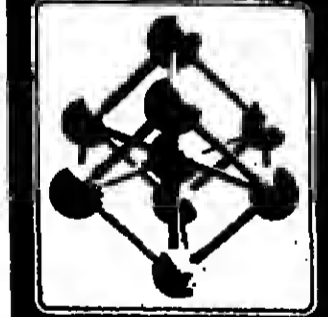
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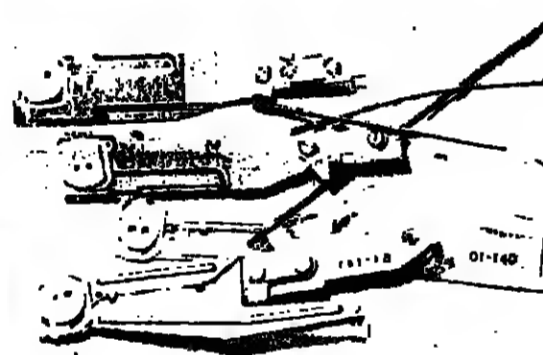
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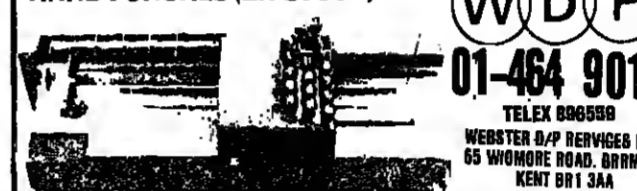
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PRODUCT NEWS

Productivity boost for WP system

AN OCR page reader which is said to improve radically the productivity of word processing systems, has been introduced by Lexiscan.

Called Context 1210, it enables original typed pages to be read and stored directly into the WP's memory, thus bypassing the keying stage.

Manufactured by Bittroughs,

Cleaning kit from 3M

A CLEANING kit for use with electronic, recording, office and computer equipment is available from 3M.

It is CK-90, and 3M says it has been designed to remove contaminants and debris from components of magnetic recording

the Context 1210 can be loaded with up to 50 pages at a time and scans about 250 pages an hour, says Lexiscan.

Copy can be prepared on any single element typewriter that has an OCR-B font. The author then marks corrections before handing the copy over to the operator who, after input, corrects the page as per copy, says Lexiscan.

Context 1210 is said to interface with most video-based word processors, whether standalone or shared logic types. It can be connected by hand to the host's communication port.

Alternatively, it can be supplied with a diskette or cassette writer to allow off-line media conversion. A range of interfaces is available as well as dedicated media writers for older equipment.

Conversion from one storage medium to another is achieved by typing the output and then passing it through the Context 1210, says Lexiscan.

Equipment, but can be used for computers and other electronic equipment. It costs £11.50.

Data Products Group, 3M United Kingdom Ltd (CW), 3M House, PO Box 1, Bracknell, RG12 1JU. Tel: 0344 55602.

Lexiscan Ltd (CW), 27-28 Newbury Street, London, EC1A 7HU. Tel: 01-806 3652.

32K-word add-in card for LSI-11s

FROM Dialog Marketing comes a high density add-in expansion memory for the Digital Equipment LSI-11, LSI-11/2, POP 11/03 or Hoehst Kit H11 systems and it requires no option slot for 32K-words of memory.

The CI 1103 is available with either on-board distributed refresh or external refresh. It comes in 8K, 16K or 32K configurations and is addressable in 2K increments up to 128K. The 32K configuration costs £840.

Dialog Marketing (Electronics) Ltd (CW), Unit 11G, Rose Industrial Estate, Bourne End, Bucks. Tel: 02625 26729.

Plug-in analogue input boards

TWO plug-in analogue input boards, the MPI210 and the MPI216-PGA, which are for use on the Digital Equipment LSI-11 family of microcomputers, have been announced by Burr-Brown.

Each board can be plugged into an empty dual-wide-card slot in any LSI-11 or LSI-11/2 systems. The only additional connection required is an analogue connector, says Burr-Brown.

Both boards accept inputs from 10 millivolt FSR or 10 volt ESR arranged as either 32

single-ended inputs or 16 differential inputs.

Included on both boards are analogue multiplexer, a sample and hold amplifier and a 12-bit analogue/digital converter with over-voltage protection to 5 volts DC provided. The user selects interrupt or polling mode for data access with a throughput accuracy of 0.025% specified for both models.

The MPI216-PGA has an additional on-board programmable gain amplifier which allows the host computer to select gains from 1 to 1,024 V/V. The PGA version also includes an on-board RAM which is used to store the gain level for each channel so that gain can be set automatically when a channel is addressed.

Burr-Brown International Ltd (CW), Casselbury House, 111 Station Road, Watford, WD1 1EA. Tel: 0923 33937.

EPROM programmer

A UNIVERSAL production EPROM programmer/fault locator, Model P20, has been announced by Elan Digital Systems of Crawley, Sussex. The P20 gives English language visual instructions to the operator which, Elan says, tells him what is happening, when it happens, why a fault has occurred and what the fault is.

It is supplied with personnel cards to handle current EPROMs (4K to 32K) from most major manufacturers. Up to 10 EPROMs may be programmed simultaneously. A plug-in option allows up to 20 at a time to be programmed.

A single key operation allows faults to be isolated and displayed for comparison, says Elan.

Elan Digital Systems Ltd (CW), 10-20 Kelvin Way, Crawley, West Sussex. Tel: 0293 510446.

Lowndes-Ajax services

THREE brochures from Lowndes-Ajax Computer Services give details of its financial planning and accounting services.

The first is on Simplan, a multi-purpose planning, budgeting and modelling language developed for managers, planners, accountants and analysts but can also be used by people with no DP experience, says Lowndes-Ajax.

The second is for monitoring the payment of debts and the third is about its general ledger systems. All the brochures explain how these systems work as well as their various uses.

Lowndes-Ajax Computer Service Ltd (CW), Milton House, Milton Road, Croydon, CR9 2XG. Tel: 01-869 2244.

5.2 mbyte disc

A DISC cartridge with a capacity of 5.2 megabytes that is compatible with Digital Equipment Corp. load drives has been introduced by Nashua.

Certified at 3,725 bits per inch, the cartridge is configured with 40 sectors and 256 cylinders. Opening and closing of the cartridge is via a single function handle.

Computer Products Division, Nashua Corp (CW), Cory House, Bracknell, Berks. Tel: 0344 52711.

Brushless DC motor for 8-inch drives

CLAIMED to be the first complete brushless DC motor for high power fixed speed drive applications, the Papi GA680.1SP was developed by the Winchester 8-inch fixed drives.

The motor features optical commutation with the drive electronics. It incorporates circuitry to provide a fixed output speed over a wide load.

The motor runs on 24 volt DC, but can be used with 100V AC supplies. This gives an output speed of between 2,500 and 5,200 revolutions per minute.

Papi Motors Ltd (CW), Parnell Court, East Portway, Andover, Hants. Tel: 0248 53653.

92K bubble memory

FROM Sinto is a bubble memory module compatible with the Intel Multibus and based on Texas Instruments TIB 0203 chip.

Each module provides 92K bytes of non-volatile storage as well as control logic and page buffering, and can be used with both 8-bit and 16-bit systems. Cost is about £1,250 each.

Sinto Electronics Ltd (CW), Arkwright Road, Reading, RG2 0LS. Tel: 0734 85464.

Appointed agent

HAWKE-Cramer has been appointed London and South East agent for the Old Microline 80 dot matrix printer.

Hawke-Cramer Ltd (CW), Hawke House, Green Street, Sunbury-on-Thames, Middx. Tel: 01-879 7799.

Micro development kit

TEKTRONIX has introduced a software development and debugging package for the Zilog Z8000 and Intel 8088 16-bit microprocessors. One for the Motorola 68000 will be available in the autumn.

Initial offerings will include assemblers and prototype debug packages that can be downloaded from an 8002A MDL.

Real time prototype analysis and in-circuit emulation will be provided through a peripheral unit which programs can be downloaded from an 8002A MDL.

The unit will support 28000 and 80000 chips. It is currently working on parallel as well as high level language and has high level emulation for each chip.

Tektronix Ltd (CW), Broomfield House, PO Box 88, Broomfield, Barking. Tel: 0582 73331.

Development kit for Intel micros

A MICROCOMPUTER development centre which provides a cartridge hard disc based system for a variety of Intel microprocessor families is available from the manufacturer.

Called Model 240, it provides 73 megabytes of storage plus an integral flexible disc with 250K bytes of storage and is intended mainly for 8086 and 8088 users with large numbers of programs available to compile, assemble, link and locate, says Intel.

The system employs a 5440 type cartridge and Intel claims that the Model 240 will cut compilation and assembly time by half. The cartridges are protected by a magnetic locking system to prevent accidental removal and insertion.

The Model 240 also includes a CPU, 64K-bytes of RAM, 4K-bytes of ROM, a 2,000 character capacity screen, a full ASCII keyboard and the resident flexible disc.

Each cartridge provides 3.65 million bytes of storage with a data transfer rate of 2.5 megabits per second. The controller, implemented with Intel's Series 3000 bipolar microcomputer set, interfaces with the Intel Series 11 system bus.

The disc controller, resident in the card cage, consists of two boards: the channel board and the interface board.

The channel board receives, decodes and responds to channel commands from the Intel 8080A-2 based CPU. This board requests and maintains DMA master control of the system bus and generates the appropriate memory commands, says Intel.

The board also acknowledges input/output commands as required by the Intel system's bus. The disc controller may co-ordinate with the Intel double density controller to allow up to 10 million bytes of online storage.

The interface board provides the disc controller with a means of communicating both with the disc drives and the Intel system bus. It also validates data during reads using a cyclic redundancy check polynomial and generates the appropriate memory command.

Intel Corp (UK) Ltd (CW), 4 Between Towns Road, Cowley, Oxford, OX4 3NB. Tel: 0866 771431.

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Intel Corp (UK) Ltd (CW), 4 Between Towns Road, Cowley, Oxford, OX4 3NB. Tel: 0866 771431.

A two-page review of some of the latest kit on the market

Up to 16 processors on bus

A SINGLE/multi-processor bus system based on single Euro Card modules has been developed jointly by Protolog and Qual-Tech Engineering Services.

Called Pro-bus, the system permits up to 16 processors to share common facilities, say the developers. A special feature is said to be the ability of processors to access independently input/output and memory buses simultaneously.

The Z80 based processor card is already supported by facility cards which include power supplies, non-volatile memory, current loop/V24 interface and parallel input/output cards.

Qual-Tech Engineering Services Ltd (CW), 6 Westfield Road, Sutton, SM1 2JY. Tel: 01-683 3137.

Footrest

THE Ergoblock adjustable footrest from Castwood Products of Bude, Cornwall, has been re-designed to give increased width from 300 to 390mm, a better paint finish and a fluted rubber mat set into a cavity.

Castwood Products Ltd (CW), Kings Hill Industrial Estate, Bude, Cornwall, EX23 8PW. Tel: 0286 2822.

Telex prep

INTERSCAN has made available a Telex type preparation option for its 33 wordmark communications word processor. The firm says that this is to enable users to employ the system's screen to get error-free tapes.

Intercomm Communication Systems Ltd (CW), 39 Muntrose Avenue, Slough, SL1 8BS. Tel: 0753 70821.

Silencing Diablo printers

THE Power Equipment Co has introduced a re-designed acoustic silencer to make life quieter for data processing staff using models in Diablo's RO printer range.

The silencer is made in metal, lined with thick foam and encloses the printer. The front and top of the unit is a transparent acrylic window which allows full visibility of the printout.

To gain access to the printer the operator lifts up the window which is held in the up position by friction hinges.

Slots in the rear and base of the silencer allow paper inlet and outlet, and a cooling fan is built in. The silencer measures 69 x 53 x 40 centimetres and is available in mist grey or natural metal.

The Power Equipment Co Ltd (CW), Kingsbury Road, London, NW9 8UU. Tel: 01-205 0033.



FROM Toshiba is a pocket calculator (pictured above) that is also programmed to show a full month display for any date between 1801 and 2099 as well as to act as a clock, alarm and stopwatch.

The liquid crystal display shows the year, month, the complete month in calendar form, the day and time. Additionally, it will show if the electronic alarm is set and its time setting. There are full calculator functions with eight digit display, an independent function memory, square root, per cent and sign change.

Called the LC-840WA, it is 86 x 125 x 6 mm and weighs 75 grams. Suggested retail price is £49.95 plus VAT.

International Office Products Ltd (CW), International House, Windmill Road, Sunbury-on-Thames, TW16 7HR.

Full Ascii set on touch sensitive keyboard

A MARK 3 version of Star Devices' touch sensitive keyboard has been introduced and it has standard QWERTY layout with the full Ascii character set provided via the use of control and shift keys. Shift lock is provided with LED indication and a separate numeric cluster is available. Character acceptance is indicated by an audio beep with volume control.

Standard output is 7-bit parallel Ascii encoded with both odd and even parity forming the eight bit. The unit requires a power supply of 5 volts and so option of on-board regulation is available. Other options include serial output compatible to RS 232C/V24, 20 milliamper current loop, on-board baud rate generator and TTY format output.

The characters on the touch keys are printed under the surface of the polyester touch area. This surface is sealed after assembly.

The Mark 3 keyboard is supplied in a low profile matt grey plastic case complete with gold-plated edge connector and the unit carries a two-year warranty.

Star Devices Ltd (CW), Unit 1, Mill Lane, Newbury, Berks. Tel: 0635 40405.

Star Devices Ltd (CW), Unit 1, Mill Lane, Newbury, Berks. Tel: 0635 40405.

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Star Devices Ltd (CW), Unit 1, Mill Lane, Newbury, Berks. Tel: 0635 40405.



Star Devices' touch sensitive keyboard, Mark 3.

Radio synchronised clocks

UP to 60 slave clocks throughout an office or factory complex can be controlled by an updated version of the electronic quartz Telebox system from English Clock Systems.

The system is radio synchronised and was developed in Switzerland by Patek Philippe. English Clock Systems says the system is the only one of its type on the UK market.

The time data delivered by the system has a 500% higher output than the earlier unit it replaces, and it eliminates the need for cables, says ECS.

The Telebox T maintains a radio link with a time signal transmitter at Rugby, which has a 1,000 mile range. This means that the system can be installed anywhere in the UK, Eire and on parts of the Continent.

ECS says that the change from Greenwich Mean Time in British Summer Time is effected automatically by a code transmitted by the station.

A power source control unit isolates the slave clocks automatically should there be a change in voltage that would prevent them keeping good time.

During the cut-out period, all time pulses would be memorised and the unit will restore all slave clocks under its control to the correct time immediately power levels are restored.

A model with battery back-up is available.

Also incorporated are electronic circuit breakers which protect the pulse output.

English Clock Systems Ltd (CW), Indus House, Chase Road, Park Royal, London, NW10 6QE. Tel: 01-885 9011.

Handbook on ITT 3800s

A TWELVE-page handbook designed to help systems designers with distributed processing is available from ITT Business Systems.

It describes the ITT 3800 which can be used as a front end processor or as a remote concentrator in a communications network. The ITT 3800 can, for example, simultaneously act as a front end for up to eight IBM 380, 370, 303X or 43XX processors.

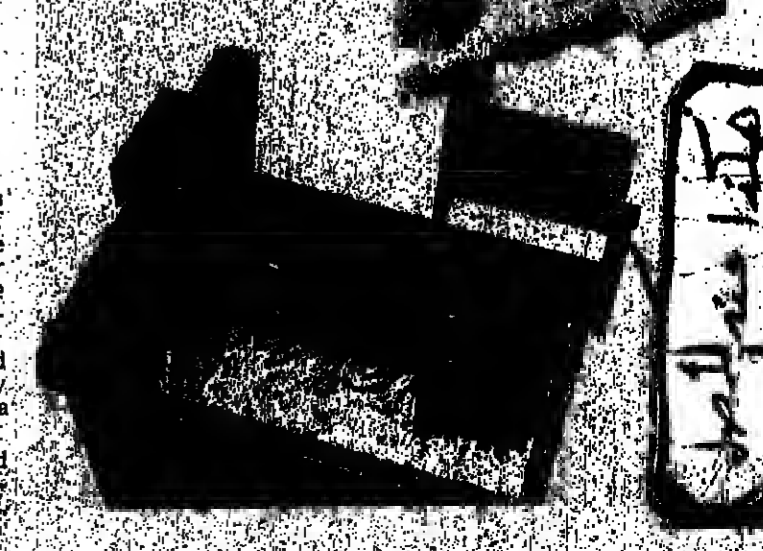
ITT Business Systems (CW), Lion Building, Crawfords Road, Hollingbury, Brighton BN1 5AN. Tel: 0273 90711.

Low-cost shredder

DESIGNED to bring the benefits of shredding within the reach of all paperwork handlers, the low-cost Lawco personal paper shredder fits over most waste paper baskets and the only control is an on/off switch.

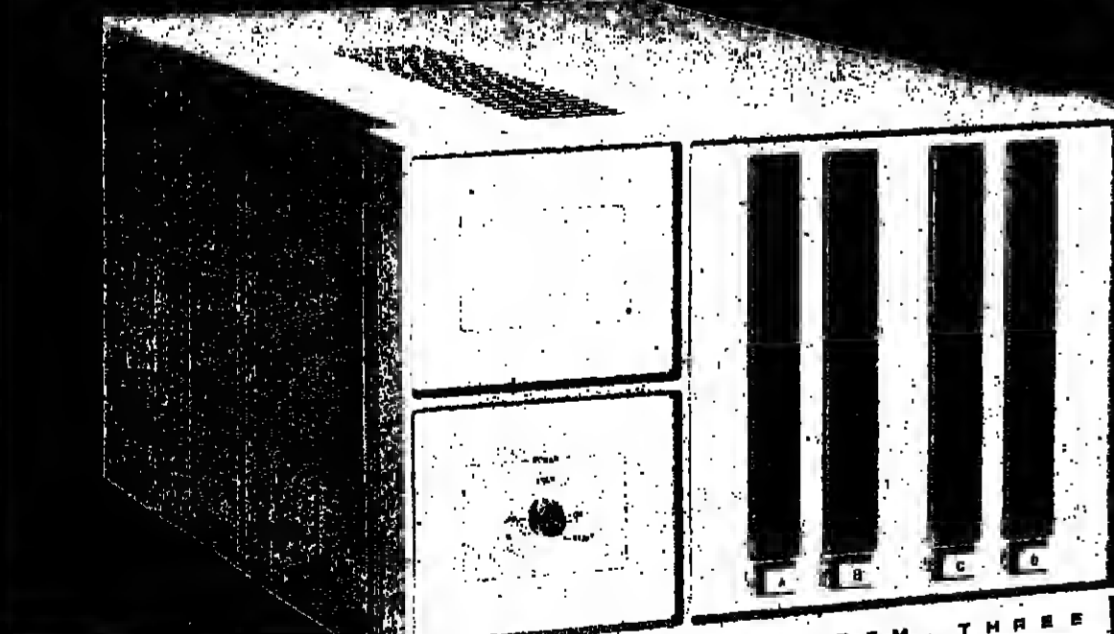
As each sheet of paper is fed in, the machine is automatically activated and the document is reduced to thin strips.

Lawtons of Liverpool Ltd (CW), 80 Vauxhall Road, Liverpool, L69 3AU. Tel: 051-227 1212.



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Cambridge	Cambridge Computer Store, Cambridge 0223 88185
Oxford	London Data Systems Ltd., Dublin 372082
Widford	The Byte Shop, Hord, Essex 0454 2177 also at Tottenham Court Road, London 01-498 0647
Leeds	Holdens Ltd., Leeds 0532 466484 also at Wetherby, West Yorkshire 01937 529466
London	Digitals Ltd., London W1 01-438 0105
Manchester	Computer Workshop, Manchester 061-226 2280 also at West Park, Leeds 0532 788485
Newbury	Newbear Computing Store, Newbury, Berks 0345 30505
Newport	Micromedia Systems, Newport, Gwent 0453 08829
Nottingham	Computers Ltd., Nottingham 0602 40676 also at Birmingham 021-422 7142; Manchester 01-236 4737; Olney 0451-322 3480
Sheffield	Hallam Computer Systems, Sheffield 0424 55128
Southampton	Wiles Systems Ltd., Southampton 0703 38740
St. Austell	Grandmark Computer Systems Ltd., St. Austell 0729 81000

LAURA TATHAM LOOKS AT VOICE RESPONSE IN ACTION



ABOVE — one of the bulk stores at Golden Wonder's crisp factory at Corby, Northants. These stores, which are filled up in autumn, can hold up to 8,000 tons of potatoes. The potatoes are kept under special conditions to ensure their freshness.

RIGHT — Jackie Rowan, the US actress who does all the UK recordings for MCS's voice response system, stands to a completed application for the first time.

Speeding up crisp deliveries to shops

EVERY year Britons munch their way through £400 million worth of potato crisps, salted nuts and other packaged snacks. Competition for this rich market is brisk and for two main reasons the race tends to go to the swiftest.

First, freshness is all-important and product shelf life, comparatively short. Second, though many people may prefer a particular brand they will usually settle for another when it is not available.

For Golden Wonder, which manufactures these delicacies at several different sites and distributes through 13 depots all over the UK, including Northern Ireland, the 72 to 96 hours that used to elapse between receipt of orders and delivery to customers was too long. For that reason it set up the system it calls SOLID, Sales Order Logging and Distribution, which can cut that period to 48 hours.

The speed-up was achieved by incorporating an MCS voice response system into existing online computer procedures.

Potato crisps, the company's highest selling line, are made at several factories, each of which serves a group of depots in its area. Three other factories also serve all the distribution centres. Because the products are relatively perishable, depots turn over their inventories very quickly.

Though sales and market forecasts are used to determine the outline production plan, the daily pattern is governed by very recent orders. The faster these can be recorded and summarised, therefore, the better the match between output and customer requirements. Also, because machinery must be thoroughly cleaned between changes from one flavour of crisp to another, fast accurate short-term order information may bring an economic advantage by allowing longer production runs.

All Golden Wonder's 20,000 customers (most are supermarkets) are visited once a month by one of the company's 140 salesmen. Midway between personal visits, orders are solicited

by tele-sales girls based at the same depots as the representatives. The work of both teams is co-ordinated by a computer-prepared canvass control sheet.

In the past, customer details were pre-printed on order forms with metal address plates. Every day, each salesman mailed his orders to the depot and these, along with those taken by the tele-sales girls, were processed locally and sent to the Market Harborough computer centre after delivery. Batch processing on an ICL 1900 prepared invoices.

To speed up depot processing, Data General Nova 2s were installed at each location and orders were keyed in through local VDUs, updating the database. The information was then used to prepare picking lists and load summaries.

Although this system was a significant improvement, the problem of keeping the customer files up-to-date still remained. The solution was the development of online systems on the head office 1900 using ICL Applications Manager (a

superb piece of software) says Stuart Shuttleworth, Golden Wonder's management services manager.

The first system was customer file maintenance, closely followed by salesforce work planning which meant that the individual salesman's order delivery blanks could be pre-printed by the headquarter computer and mailed out daily.

Online processing was a great improvement on the earlier methods. There was, however, still one vulnerable spot: dependence on the Post Office for getting representatives' orders to the depots.

"When the directors asked us to find a way to speed up order turnaround yet more, we looked into several different approaches," Shuttleworth said.

"These included two voice response systems. After visiting some US installations of the Periphonics system marketed in Britain by Menzies Communications Systems, we came to the conclusion it was the more flexible. We wanted to keep our options open and, for example, be able to attach VDUs to it if we wanted."

"Of all the systems we had seen voice response was the least expensive at £72,000 for the particular set-up we wanted (though this also involved use of the existing Nova 2s). The starting price of the others worked out near the quarter-million mark."

Reliability was also a major consideration for Golden Wonder. It uses the simplest form of MCS processor (which has its own built-in redundancy) as a front-end, feeding to the pair of Nova 2s at the computer centre. Each has 64K of main memory, 10 megabytes of store split between a fixed and a removable disc, and a nine-track tape. The two are completely switchable.

The mainframe is not involved in any stage of order recording, though it does prepare on tape copies of the most recent customer and price files used by the Novas for checking purposes. In the event of mainframe failure, however, the previous day's file could be used with little disruption.

The low-cost, portable MCS terminal has a numeric keypad and a few control buttons and can transmit via a telephone through an acoustic coupler. At

the end of the working day each Golden Wonder salesman calls the computer centre via the GPO Freephone system. Voice response confirms his connection and asks for his identity number. Next he is asked to indicate his choice of mode — basic, intermediate or advanced. The last is most used by the experienced since it signals acceptance of most data by "beeps".

The system's pleasant feminine voice then requests in succession the customer's account number, order number and product codes and quantities. The system applies check-digit verification and field credibility checks and validates each entry against the database before accepting the next. Provision is also made for entering orders for new customers and for amendment of existing detail such as delivery instructions. There is a playback facility for the user who has "lost his place" owing to an interruption or thinks he may have forgotten to enter an item.

At 9pm the voice response system automatically closes down, though it allows any transmissions in progress to be completed. The Novas then sort the orders into depot sequence, making up a file for each of the 13 depots. Customer names and

The short shelf life of crisps means that every effort must be made to get the orders in faster. This means that traditional orders given to the salesmen are out and some direct interface with the computer is in.

Golden Wonder picked a voice response system marketed by Menzies Communications. Laura Tatham takes us on a tour of the system.

addresses, product descriptions and prices are added from the database.

The system then automatically rings the depots in turn and transmits the data for storage on the discs of the local computers.

These add to the new orders that were not delivered the previous day and print warehouse picking lists. The also prepare a complete schedule of orders for the road planning staff who, after working out delivery routes, enter the detail into the Nova which creates a load summary. Customer invoices are prepared on the ICL 2956 at the computer centre.

Incorporation of the MCS voice response system into Golden Wonder's online order processing has successfully achieved the prime objective of faster turnaround of customer orders and a further 50 MCS terminals have now been ordered to extend the system.

Complete sentences improve speech quality

THE voice of the MCS voice response system is not electronically synthesized, but human. For applications that demand a large repertoire of responses, each is created by stringing together a different combination from a vocabulary of separately pre-recorded words, giving a slightly robotic effect.

In Golden Wonder's application, however, the number of responses is sufficiently small to allow the use of complete pre-recorded sentences. This feature — unique to MCS — considerably improves the quality of delivery.

Periphonics, the manufacturer of the system marketed here by Menzies Communications Systems, is a US company, so voice recordings are prepared in New York.

The speaker for British companies is Jackie Rowan, a young American actress who, having

studied drama in London, can successfully persuade the listener that she is English.

Being the voice of a computer is far more demanding than one might think, says Jackie. "I have to study the vocabulary and first to know it thoroughly — like learning the lines of a play. Recording takes a lot of concentration, so it is very tiring. I always work with the thing well before and we get the perfect together. But we have to be able to do up to 30 takes of a single word before we are satisfied."

"The sound recording equipment is incredibly sensitive and it detects the slightest change in your voice. I once ruined a session because I had a microphone cream on my nose, which was picked up by the microphone and set off my tongue."

At 9pm the voice response system automatically closes down, though it allows any transmissions in progress to be completed. The Novas then sort the orders into depot sequence, making up a file for each of the 13 depots. Customer names and

COMPUTER - AIDED DESIGN

Powerful tool for the craftsman

by Dr Patrick Foulk and Alan Mason

THE computer-aided design of engineering systems can be split into the interrelated areas of design automation and design verification.

Design automation is specifically aimed at using the computer to relieve the tedium of a design task by carrying out the well-defined or repetitive operations. In contrast, design verification is used to prove the engineering integrity of a system through the use of design rules and/or simulation.

Used by itself, design verification can give the designer a better insight into his product by enabling him to observe the effects of varying the parameters. However, it is best used in a CAD system to relate the initial specification to the performance of the design as produced by the design automation package. Any CAD system must be considered deficient if it does not have provision for both of these components.

Far from replacing the professional designer, CAD packages should be considered as powerful tools which require the guiding hand of an experienced craftsman to be effective. As with any successful tool they must be designed with their eventual role in mind and structured to form a comfortable working environment rather than making concessions to ease implementation. This involves the marrying of a variety of computing disciplines such as database management, man-machine interfacing, numerical methods, operating systems development and language design.

Early CAD packages were, of necessity, implemented on large machines and, using somewhat dubious arguments of portability, programmers commonly wrote them in Fortran or, on grounds of speed, in machine language. They operated in batch mode, requiring the complete initial specification of design constraints and allowing no subsequent modifications during processing.

The designer was in fact divorced from those tasks which were "automated". It is encouraging to see that current packages tend to be written in the more recent structured high-level languages, as is deemed good programming practice. This has increased package flexibility while improving maintenance and reliability.

The number and variety of computers now available and the development of good time sharing operating systems allows many CAD tasks to be

carried out interactively, with the designer forming an integral part of the design cycle. Instead of the unintelligible mass of data which formed the input to early packages, current input specifications centre upon the use of more natural dedicated languages. Thus design descriptions can be made self documenting.

Graphical mode input, while being desirable for many CAD applications, is expensive because of the need for high-quality dynamic displays or digitisers and many only be considered for high-cost applications. Graphics is more often used as an output medium. Low-cost, static displays are used to present intermediate results and for the designer in check before committing final output to hard-copy units. It is desirable that packages should provide varying levels of automation, the amount of dialogue used being at the discretion of the designer. The presentation and form of interaction used should be such that the underlying vehicle is transparent to the user and ideally

forms a machine-independent package. The high initial cost of CAD development compounded with mistaken ideas of the sociological implications has given rise to an acceptance barrier in industry. The reduced design costs and increased throughput provided by CAD systems lead to improved, more reliable products and enhanced competitive viability.

It is unfortunate that much of CAD-related research is carried out in an academic environment, since such institutions rarely have the resources to carry the development through to a production system. The National Research Development Corporation and more recently Compendo have been attempting to redress this situation and the Science Research Council is developing an interactive computing facility which it is hoped will increase the availability of design software through computer networking. A major obstacle still to be overcome is the interfacing of many independently developed and disparate systems.

Broad spectrum at CAD80

CAD 80 will run from March 31 to April 2, with registration on the morning of the first day, or the preceding evening. It will be held in Brighton, at the Metropole on the seafront, and registration is £55 per day, or £115 for the three days. Both figures are exclusive of VAT but inclusive of lunch and the complete conference proceedings.

Forms may be obtained from the Conference Secretary, CAD80, IPC Science and Technology Press, PO Box 63, Westbury House, Bury Street, Guildford GU2 5BH.

There will be an exhibition of CAD-related hardware with the conference and a series of papers will be presented by system suppliers.

The conference and exhibition are organised by the Journal Computer-Aided Design with sponsorship by Computer Weekly.

THE fourth international conference and exhibition on computers in engineering and building design, CAD80 is aimed at bringing together research workers and industrial designers in an atmosphere conducive to the interchange of information and experience.

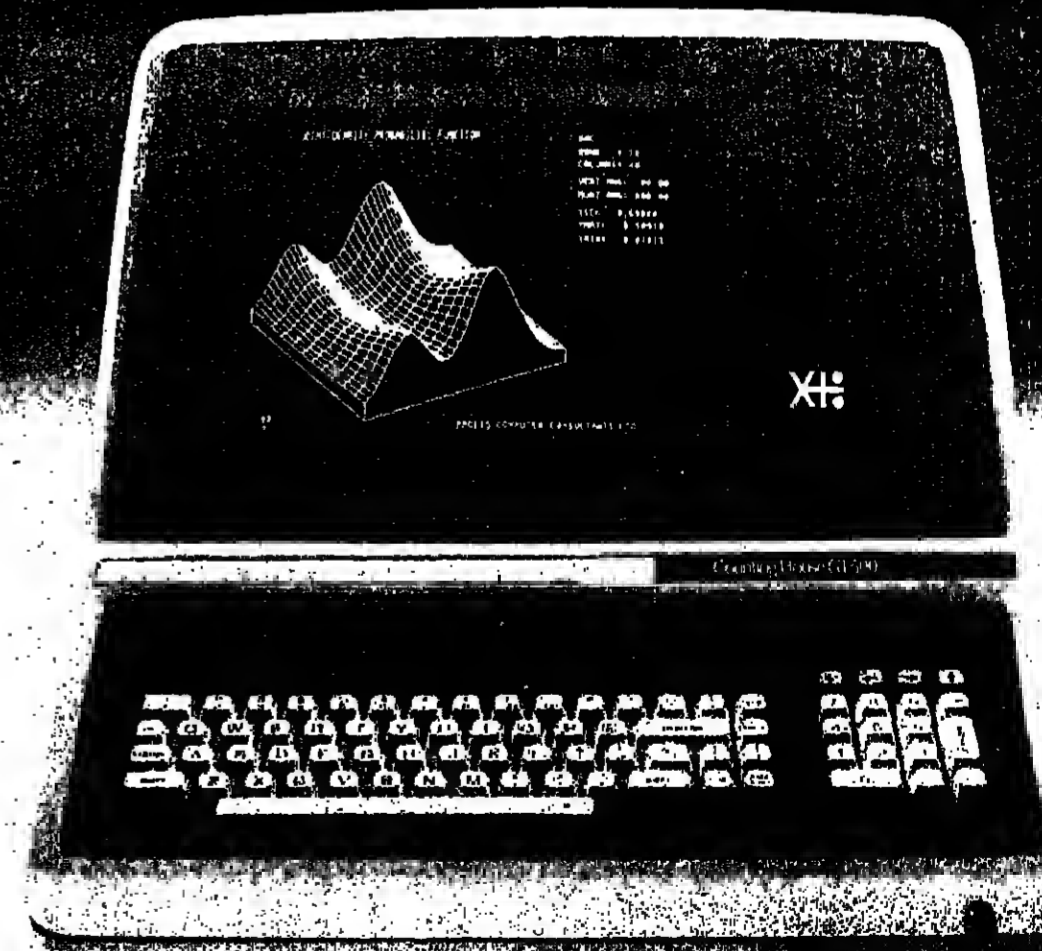
Such is the broad spectrum of CAD interests that the three-day conference is divided into three parallel sessions dealing with basic techniques, industrial experience and applications (research and development). In these categories individual sessions deal with the various subject areas and in the following description selected papers are referenced to show the basic themes.

1. Methodology, management and standards. These sessions present papers describing some generalised approaches to the techniques

• Turn to page 24

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Problems that used to be insoluble

by Phil Cheetham

THE application of CAD techniques in engineering areas such as structural design is a discipline which in recent years has seen an increasing convergence between the improvements in mathematical modelling techniques, developments in graphics and a greater understanding by the engineer of the extent to which CAD enables more comprehensive structures to be safely designed.

In fact, the influence of computers on the solution of structural engineering problems is probably greater than in any other field of engineering, and has even enabled problems to be solved that were insoluble before.

The use of computers in the analysis of structural problems provides numerous advantages to the engineer in the performance of design work. Detailing aids and drawings for certain types of structure may be obtained to offset the high cost of technical draughting and/or

of the graphical aids produced for data checking to ensure against time-wasting on poor results. Similarly, the final problem solution may be presented in graphical terms, reducing the time required for an engineer to assess the viability of a design.

Graphics, which has already made an impact on structural design, is a massive subject in itself. The principal areas include data generation using interactive display terminals, automated draughting and

automated design.

Data generation techniques produce masses of bulk data to be input to large systems through the interactive use of graphics display terminals and digitisers. Here the engineer uses a drawing and digitiser to define numerically the component — for example, a building, part of a plant, or structural component — and a computer program is utilised to create the input data for a larger program.

The average mechanical draughtsman spends about 50% of his time producing detail drawings of machined components, and typically between 200 and 300 drawings are produced. Systems have now been developed which allow the draughtsman to describe the component simply by a set of instructions.

These instructions are fed into a terminal at a workstation which incorporates a plotter, and the data is processed on a mainframe. The processed information is then transmitted back to the work-station and a drawing of the component is created. Drawings are produced in about one-third of the time.

The area of automated design is still very much in its infancy and it will be a number of years before powerful, completely general-purpose systems linked to manufacture and planning are available.

There are, however, a number of simpler or specialist systems which allow designers to develop designs conceptually with the aid of interactive graphics terminals linked to a computer. The computer will allow the designer to cost projects, "size" components and examine the effects of changes to the design.

Constant development in the area of graphics will have an increasing effect on the productivity of automated design, particularly in the ability of remote terminals to access more economically the large general-purpose design systems. In the past it has not been economic for many aspects of engineering design to be carried out interactively using remote access, for it is not only the large systems, but much of the graphics generation which has to be held on the mainframe for access. This has been due to high line costs of communication to the mainframe and the high data volumes involved when using what have been relatively dumb terminals. Already this situation is being partially relieved due to improvements in distributed processing.

Further developments will enable the use of microprocessor-driven intelligent terminals with their own software capable of handling much of the graphics generation. This will reduce the amount of data that needs to be transmitted from a central processor and will make engineering design much more economic for smaller, yet complex projects.

Such developments will also take some of the pressure off those areas where the large mainframe is having a big impact on engineering computing, has had tasks transferred to it which create more problems than are overcome.

For example, an individual department may have a constant need to utilise a particular large engineering system and thus may have it transferred from the company's mainframe to its own departmental mainframe. However, data within the system is frequently of a common nature, and required by other departments whose ready access to such information is prevented. This does away with

much of the economic advantage of mini-based processing for the organisation.

Among the many CAD techniques available which provide powerful design solutions for the structural engineer are finite element programs. These are used to represent real engineering situations by a series of finite elements joined together at node-points which define the geometry of the problem. The finite elements themselves are defined so that their behaviour can be related to the nodes by equation systems.

Unfortunately, the accuracy of the equation is often a function of the shape of the element as prescribed by the geometry of the problem. Also, some elements are more invariant to geometrical distortions in shape than others. Many finite element systems, however, have incorporated numerous types of elements, often without due regard to the behaviour of the elements in different shapes and under different conditions.

Work is now proceeding to introduce standards on which elements can be tested to create, say, ratings under different conditions so that engineers can select appropriate elements and systems for given tasks.

Phil Cheetham worked on computational aspects of stress analysis at SAC, and then on finite element analysis which included the coordination of the structural analysis of the Tornado military aircraft. He joined Scleron Computer Services in 1978 as a structural engineering consultant and is now responsible for Scleron's Applied Engineering Division.

Many programs are available — examples are:

1. Stress. A simple and inexpensive system, based on beam and endload elements for two or three-dimensional frames, capable of being used in interactive and batch mode.
2. Strudl. A structural design language which consists of a series of computer programs for solving problems in structural engineering. It forms an integral part of Ica (Integrated Civil Engineering Systems) developed by the Massachusetts Institute of Technology.

Data requirements are very similar to Stress so that problems which are too large for the simpler package may be quickly updated for Strudl.

3. Aaaa (Adaptive Structural Analysis System). Rapidly gaining ground as a major structural engineering program. The system has been to provide an easy-to-use, versatile and economical system for finite element analysis.

Two types of element make Aaaa unique. Firstly, "Force Equilibrium" elements result in force equilibrium at adjoining nodes, giving results which are easily used and interpreted by the stress engineer. Secondly, "semi-loop" elements give excellent accuracy and can reduce solution time by up to 80% in large problems.



The Westland Lynx helicopter which was structurally designed using finite element techniques.

The engineer's questions answered, fast

by Terry Mitchell

COMPUTER-AIDED design in engineering offers the user tremendous advantages in speed, flexibility, accuracy and the quick comparison of design options. Better designs in less time at lower cost, factors vital for competitive engineering today, results from successful CAD use.

CAD requires a combination of interactive computer power, a highly developed user interface for the practical design engineer user, powerful engineering analysis/design applications software, and frequently, computer graphical input and output devices for visual display of the design.

One major type of supplier of CAD facilities to engineering industries, both in Europe and in North America, is the technically orientated network computer service company. Providing access to very powerful time sharing computers, a local access telecommunications network, a range of proven, general CAD applications systems, ter-

Terry Mitchell holds an honours degree in naval architecture and mechanical engineering, and for 10 years worked at the National Maritime Institute. He is now head of structural and marine engineering at SIA.

minals and expert support, these computer service bureaux can deliver complete CAD facilities to engineering firms at low capital cost.

CAD applications areas and products include structural, automotive, aerospace, offshore, mechanical, highway, electronic and process engineering.

In the areas of oil, gas, chemical and petrochemical process plant design, some specialised service bureaux offer software which can handle the complete thermodynamic simulation of almost any process and plant units involved. The process design engineer can therefore study the process behaviour of the entire plant during the design phase, comparing and testing alternatives to obtain an economical solution.

Pipeline simulation in the process engineering industry is an obvious application of CAD. The problem facing the offshore/process engineer is to transmit the oil or gas, or both, from the rig, along pipelines to the processing plant onshore.

Questions that arise immediately include: What size should the pipes be? For what pressures should the pumps be sized? Will the gas, as it goes down the pipeline, cool and condense? If so, will the resulting increase in pressure drop be acceptable? If an emergency forces value to shut, will the resultant shock wave cause pipe rupture?

Before specialised CAD computer software became available through bureaux, engineers at large were extremely limited. There were some specialised software programs written by experts, but they were difficult to comprehend and costly. In addition, they were limited in capabilities to only relatively simple calculations. Many engineers still perform calculations by hand and are thereby

forced into making gross assumptions.

Now CAD pipeline simulation models are available to reduce these assumptions and the tedium of manual calculations. There are, for example, programs which calculate the temperature of a gas or oil at each stage of its journey along the pipeline. It can be easily predicted if or when the gas will cool sufficiently to condense and thereby result in damage to compressors.

The programs also give the designer an indication of how often "pigging" (sending a solid object along the pipeline to clear the accumulated liquid) will have to be carried out.

The effects of changes in either the feedstock or feed delivery pressures and therefore the pressure to be used for designing the pipeline, can be predicted. Information on power needed to drive various items of equipment such as pumps and compressors is also produced.

Future planning is also covered by this specialised software. Pipeline sizes can therefore be selected, for example, to allow for the formation pressure of an oil/gas well dropping over a certain period of time.

Instrumentation and control of complex pipeline systems is also becoming a demanding task for the engineer, especially when an action has to be decided upon in an emergency. This software allows the engineer to model and study the effects of the proposed control strategy. For example, if a valve is shut onshore, will this rupture the pipeline? Will the compressor "trip" (stop, because the pressure wave has exceeded the manufacturer's limit)?

Today, the engineer can obtain answers to his questions, without having to make assumptions, with greater accuracy and ease by simply dialling into a technical service bureau.

Large computer service bureaux can also offer a comprehensive and time-saving approach to the design, analysis and construction of piping systems. Design formerly involved the drawing office; individual drawings were difficult to find and to alter.

Now, however, the DLS system is available. It stores drawings electronically and can operate interactively as well as in batch.

DLS can merge different drawings, or change the scale of the drawings very quickly. It provides a database of drawings for the engineer, which can easily be retrieved. As a result of this system, which was written in the US by Arthur D. Little Inc., the drawing office is not now so necessary. Changes to designs can be carried out in seconds at a VDU or teletype, and the interface with the Adiplex stress analysis program ensures compliance with standard codes of practice.

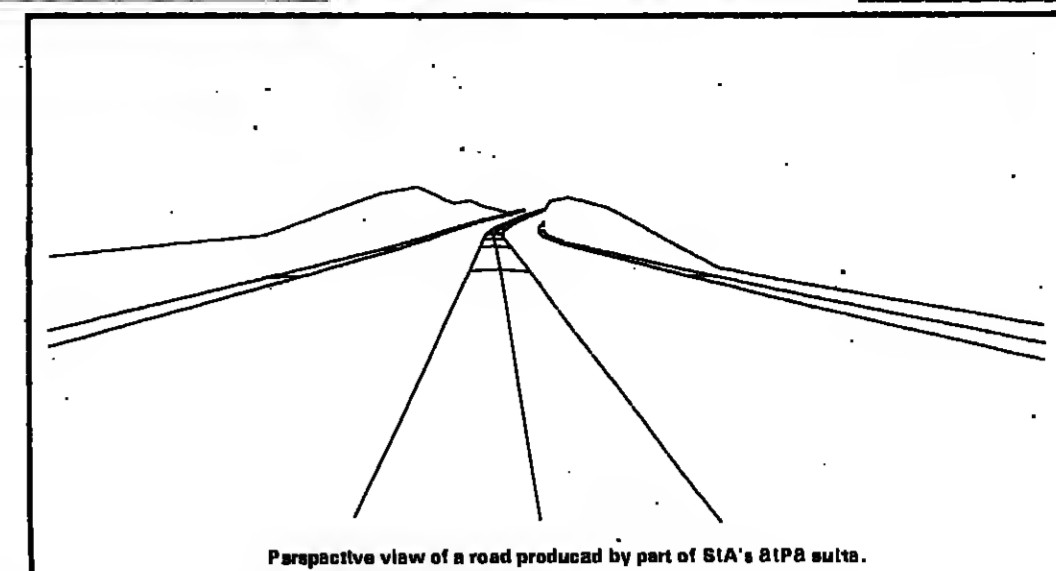
DLS also generates bills of materials, parts lists and fabrication reports and can simulate physical interferences with other equipment or structures, and draw plans and elevation views, with interference points marked.

Plots from DLS/Adiplex can be drawn either on a Calcomp plotter, a Tektronix tube or flat bed plotter, and can be of any

user defined size. Multiple levels of detail are available, from simple check isometrics to fabrication drawings with maximum detail.

Structural analysis is an important CAD area for certain specialised service bureaux. Applications can range from civil and offshore analysis, in nuclear, aerospace, automotive and mechanical engineering.

Another important CAD area is the design of highways. Some bureaux offer a service encompassing all the major design



Perspective view of a road produced by part of SIA's 81PB suite.

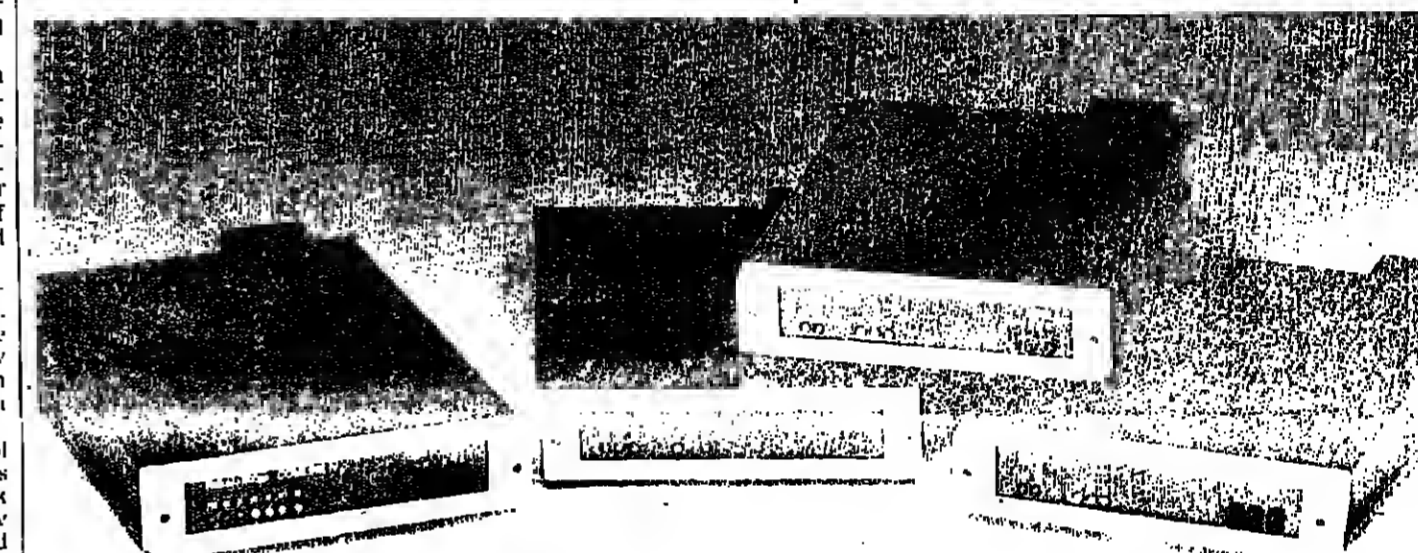
stages of a highway project, from the reduction of survey data to the production of computer-drawn contract drawings. Computer-aided design techniques are used at each stage of the job. Professional staff can take full responsibility for all aspects of the computing work but leave control of the design process in the hands of the client.

UK highway design engineers also use CAD services at

specialised bureaux for single carriageway roads, dual carriageway roads, merging of dual into single carriageways, and motorways. The ability to incorporate effects such as lay-bys, slip roads, junctions, roundabouts and interchanges is also provided, for within some specialised software products.

A further application of CAD is in electronics: the simulation of electronic circuits and the design of printed circuit boards.

A user of the circuit analysis system Astec is the European Space Agency, which has used it for the simulation of the latest European space project, and the Royal Aircraft Establishment has used Astec for simulating Concorde's electrical system. Domino can automatically route connection tracks for PCB types, and produce quality plotted board design output. Major design time and cost savings can be achieved.



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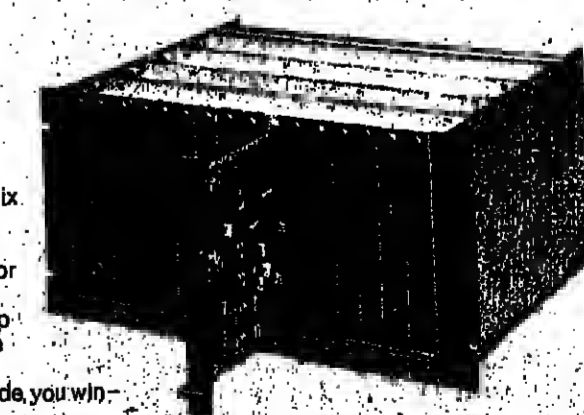
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High resolution for a fraction of the cost

by Howard Rippiner

THE whole subject of computer-aided design has been revolutionised in recent years by the availability of sophisticated graphics systems. Whereas in its early days computer-aided design was limited to number-crunching applications or fairly elementary plots based on numerical data, nowadays the designer has a host of terminals and complete interactive graphical computing systems which allow him to manipulate data in any number of ways.

Not all computer graphics systems are applicable to design,

use, of course (some are specifically designed for use in business systems, for example), and this article reviews the categories of hardware that are available and the relevance of particular features to the needs of the designer.

The initial work on computer-aided design was carried out using large mainframe computers, and the first computer hardware developed specifically with the designer in mind was the graphics terminal designed for use with a mainframe computer. At first, the

equipment required to make graphic displays from a computer was extremely expensive, and it was not until the development of the bistable direct-view storage tube that the market for relatively low-cost graphics terminals was really opened up.

The direct-view storage tube provides high-resolution, high-density graphics by storing images directly on the faceplate of the cathode-ray tube, eliminating the need for image regeneration. It also does this at low cost; when the first graphics terminal using this approach was introduced in 1971, it was one-tenth of the cost of its nearest rival.

This initial terminal had an eleven-inch screen (measured diagonally), which tended to restrict its use to fairly simple design applications in areas such as printed-circuit-board layouts, architecture, mechanical engineering, and numerically controlled part programming. Even so, these early devices are still a mainstay of the computer-aided design industry, and have formed the starting point for many large graphics installations.

On a terminal of this type, the user has 256 line pairs resolution at his disposal, and an addressing capability of 1,024 points horizontally and 768 points vertically. For users whose applications demand increasing graphics complexity, there are two alternatives: either a section of the picture can be expanded using a cross-hair cursor and a zooming technique, or the user can upgrade his system with a larger screen size.

The latter provides a higher resolution capability which in itself leads to new application areas — integrated-circuit design, more complex PCB layouts, mapping, airframe design, buildings and allied structures — but at the same time the larger terminals offer more comprehensive facilities, such as a variety of hardware-generated character sizes and different line types.

In recent years, the increasing demands from the marketplace for still higher resolutions have led to the availability of 25-inch screen terminals, intended for use in applications such as VLSI design, mapping and network modelling.

As with most types of electronic hardware, these graphics terminals have benefited from the advent of the microprocessor. For example, on terminals with intelligent graphics option enhancement, local intelligence and various storage capabilities can be built in. This means that the user can call up local macros consisting of standard, regularly used shapes (window frames in buildings, for example), and can also carry out local picture editing.

The next step upwards in intelligent systems is to build all the intelligence into an integrated desktop computing system, and about four years ago the first desktop computers with built-in graphics started to appear on the market. The first similar to these of the first generation of graphics terminals described above, but had the added feature of a 64K processor and the facility to use a high-level language.

The "friendly" high-level language used in these systems provides both the power and ex-

perience programmer needs and the simplicity desired by the beginner. Input and output commands are easy to program and debug because the commands use device-independent keywords. Commands like DRAW and ROTATE allow the user to work in his unit rather than machine or raster units.

The availability of this type of desktop graphic computer system has really stimulated the big move into computer-aided design systems which are independent of a host computer.

With these systems, the computer-aided design user, particularly in the smaller consultancy, can have access to a reasonable amount of inexpensive processing power in his office, and may also link into a mainframe computer or time sharing bureau for very heavy number-crunching applications.

The latest developments in this area have been stimulated by the use of bit-slice microprocessors, which in effect offer the speed of a minicomputer with the cost advantages provided by the micro. The new systems provide computational speeds at least an order of magnitude faster than the first desktop graphics computers, plus larger memory capacities and speed enhancements to the graphics facility using extensions to basic. In addition, faster transfer of data is made possible by RS232 and IEEE 488 (GPIB) interfaces.

For applications where the microprocessor still does not offer enough power or speed, minicomputer-based systems are now available. These systems have been designed to work effectively as terminals in a host-computer environment or, with the aid of internal programming tools, as highly flexible, standalone graphics systems. A system of this type makes use of distributed processing principles to achieve lower communications costs, lower host computer charges, and more effective man-machine

communication.

An important feature of the machines at the top end of the graphics range is the combination of refreshed display information with the storage-tube display, so that both stored and refreshed information can be displayed simultaneously. The refreshed graphics capabilities allow the user to display and manipulate moveable, selectively displayable, dynamic pictures, while the storage-tube capabilities allow the user to display very large amounts of graphics and textual information without a flicker.

For certain applications, such as simulation of moving aircraft, total refresh capability is required. A number of suppliers in the computer industry are able to provide suitable systems, although their cost tends to be considerably higher than that of a storage or storage/refresh system. This is a result of the increased complexity of the hardware needed. As the cost of computer components falls, the gap between the two technologies will narrow.

It is worth emphasising the application of the communication interfaces provided on these systems; these allow the setting up of sophisticated distributed networks which can have powerful applications in the computer-aided design field.

The usefulness of any of the terminals or graphics computers described above is dependent on the availability of complementary peripheral products, and a wide range of these is now available. Typical of these devices are graphics tablets, which can provide "freehand" digitisation of engineering drawings, flexible-disc and hard-disc stores for use with minicomputer-based systems, digitisers, hard-copy units, and line printers.

For a typical computer-aided design system based on a host computer, the work station would consist of a large-screen terminal with local intelligence



Howard Rippiner

for interactive design operation, a graphics tablet for the latter engineering drawing input and menu selection, a hard-copy unit for rapid provision of plentiful output, an A2-size flatbed plotter for engineering-quality finished drawings, and a matrix line printer for component listings and other alphanumeric printout.

Most of these devices are fairly mundane to anyone familiar with computer systems, but it is worthwhile noting the latest developments in flatbed plotters for particular attention. It is now possible to obtain interactive digital plotters fitted with joystick controls so that the user can interact with the drawing being created. In the absence of a digitising tablet, the plotter can be used for the digitising of existing drawings.

The systems described so far have all depended on the direct-view storage tube to provide graphics capabilities, and it is systems of this type that have found the widest application in the computer-aided design field. However, it is worth adding a few words about raster-scan devices. These are not nowadays in widespread use in computer-aided design installations, the main reason being their limited resolution capabilities (typically 640 x 480 points against 4096 x 3120 for a storage-tube device).

However, this reduced resolution can in some respects be compensated for by the addition of colour, which is useful in areas such as printed-circuit and integrated-circuit mask design and architectural drawings. High-quality colour graphics terminals are now available which are suitable for a wide range of graphics applications in both business and technical environments.

Broad spectrum at CAD80

From page 21

and software aspects of the subject. Under the topic of hardware there is a description of raster-scan graphic devices complemented by a description of digitising line drawings using a standard TV camera. A novel approach to real time 3D colour graphics using parallel processing elements is given, and is a good illustration of how microtechnology can advance the state of system components.

Software considerations complete the full-day session dedicated to graphics and these can be subdivided into applications and techniques. Applications cover is given in the areas of building design, and mining. Although discussed in a separate session the papers presented on databases are directed towards the storage of graphical rather than fundamental design information, the application areas of architecture and building being featured. Database retrieval specifically aimed at graphical databases is also presented.

3. Civil Engineering and Building. Presentations in the area of

civil engineering concentrate on the generation, optimisation and simulation of steel frame structures. A computer system for the design of buildings which use prefabricated concrete components is also described.

Building design, as may be expected, concentrates on the architectural aspects, and talks on specific application packages like BDS (Oxys) and Cadar 3 form the core of this. A new session has been introduced to deal with energy considerations in the performance of structures.

4. Mechanical Engineering and Manufacturing. Naturally this tends to include aspects of computer-aided manufacture (CAM) as well as CAD. Most papers deal with the cutting, forming and moulding of metal parts. A complete, low-cost, system illustrates the power of the microcomputer in CAD/CAM systems. The system can create, display and plot mechanical engineering drawings and can generate output suitable for numerically-controlled machine tools.

5. Electronic Engineering. This subject is split into sessions on two days with a blank

day between. Digital systems design is the concern of a number of the papers.

A design system for digital hardware is the subject of a paper on the total design environment. This system makes heavy use of a digital integrated circuit database.

Another minicomputer-based system describes uses of functional descriptions of generic components to allow the simulation and verification of digital designs. Other subjects covered in the sessions are the synthesis of microprogrammed controllers, circuit board routing and logic simulation.

6. Specialist Techniques. The session on geometric design starts with a review of computer techniques for the representation of geometry. Other papers cover subjects such as curve and surface representations, intersection of surfaces and the construction of 3D representations.

Four papers on finite element analysis conclude the programme. Speakers will come from user, supplier and research organisations as far afield as Japan, Korea, France, Norway, the UK and the US.

ADVANCED FILE DESIGN—Part 8

Processing indexed sequential files

BECAUSE of their versatility, indexed sequential files can be processed either sequentially or randomly, presenting the designer with a choice. We shall examine sequential handling first.

Sequential processing

A new, or newly reorganised, file will not have additions and all records will be both logically and physically in sequence. The cylinder and higher indices will only be referenced once, at the start of the run. From then on the only head movements required will be minimum ones at the end of each cylinder.

The main loss of time in comparison with a sequential file run will be due to the need to reference the track index before reading every track of the file. This may be counterbalanced by time saved on each occasion that a complete track can be skipped, because no record on the track is required.

In general terms, smaller block sizes and lower hit rates make it more likely that indexed sequential files will outperform sequential ones.

Additions to the file will lead to the loss of revolutions during sequential processing. During addition of records to IBM's ISAM files, the data track is reorganised so that the record with the highest key of those logically on the track is stored in overflow. The whole data track can be scanned sequentially, but the overflow record will cause a lost revolution because the start of the next track in sequence will have been missed by the time it has been read.

Each additional overflow record will cause a further revolution to be lost, as records with lower keys will overflow later, and so will be stored further along the overflow track than higher key records from the same logical track. This is shown in Diagram 1a. Records with keys 054 and 058 have been added to the track. The first addition requires records 056 and 057 to move up the track, and 059 is pushed into overflow.

The second addition goes directly into overflow, and becomes the first in the overflow chain.

Coyle's recommended sorting additions to ISAM files into descending order, and showed that this can reduce both addition and processing times. He also provided "dummy" records, that gave some free space in the home track and thus reduced the number of records in overflow. These two measures improved the number of transactions processed per hour by 50%.

The alternative technique of holding added records in overflow, and linking them directly to the records that precede and follow them in sequence, is shown in Diagram 1b. Again, each addition will cause a lost revolution, but in this case the order of additions does not affect timings.

Montgomery and Hubbard have carried out a comparison of IBM and ICL indexed sequential file organisations, using IBM 2314 discs and the equivalent EDS 30s. This showed that the IBM additions technique provided more rapid sequential

retrieval than that used by ICL. As would be expected, the two different file organisations gave virtually identical results in the freshly loaded state; the differences emerged as additions were made.

Direct processing

In order to retrieve a record, each reference will go through the process:

1. Reference to higher index or indices.
2. Reference to track index.
3. Seek record on home track.
4. Follow overflow chain (if necessary).

In the case of records stored in overflow, there will be a further step (although in some circumstances 3 and 4 are alternatives — see ISAM below).

The largest single factor that influences the total retrieval time is step 1. Now that every record retrieval requires a reference to the cylinder index, its location is crucial; this was dealt with in Part 7. In general terms, holding the cylinder index in main storage can reduce the whole process to not much more than half the time required if it is on the same device as the data file. Coyle's showed that

Sequential access times, batched and sorted			
Number of records	No sort time	One minute sort	Five minute sort
100	175.9	776.4	3176.4
250	75.4	315.4	1275.4
500	41.9	181.9	841.8
750	30.7	110.7	430.7
1,000	25.2	85.2	325.1
1,750	18.0	52.3	189.4
2,500	15.1	39.1	136.1
5,000	11.8	23.8	71.8
7,500	10.6	18.6	49.3
10,000	10.1	18.1	40.1

Direct access times; unbatched records	
Cylinder index on the same 3330.	101.7
Cylinder index on a dedicated 3330.	71.7
Cylinder index in main storage.	46.7

Table 1. Figures tabulated show the average time in milliseconds required to locate a record.

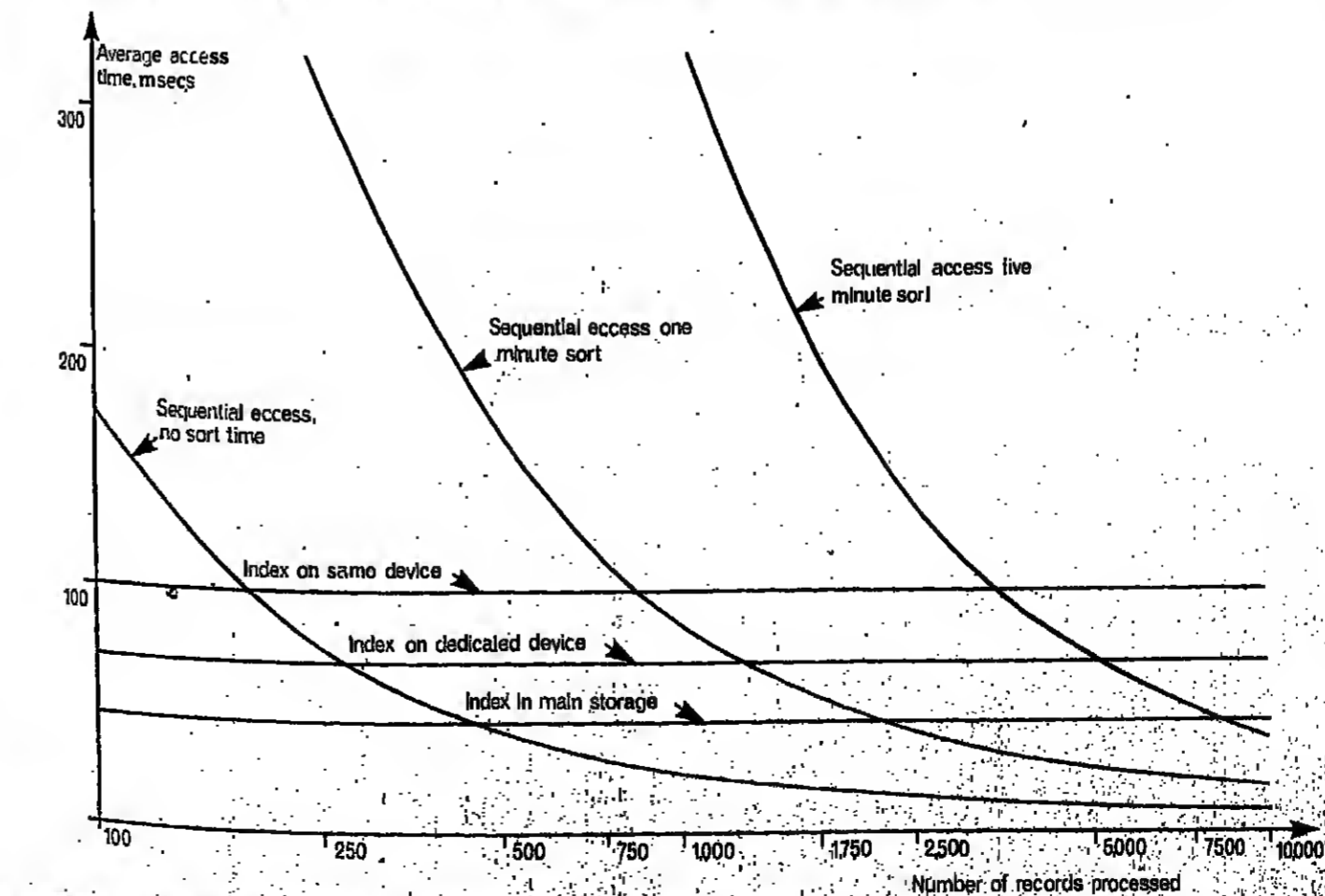


Diagram 2. This graph shows the times involved in locating records using various indexing methods.

by Owen Hanson and Norman Revell

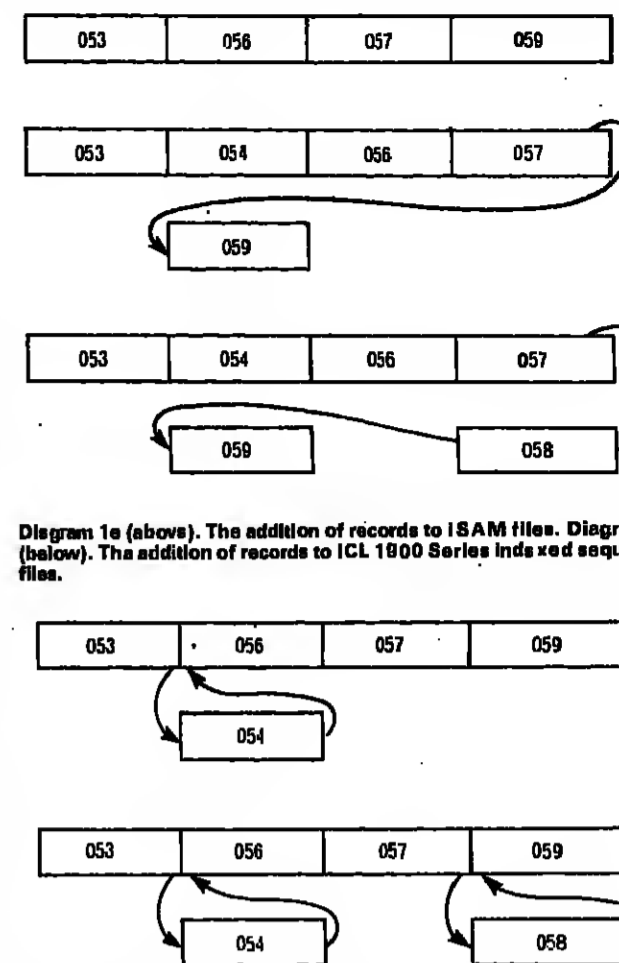


Diagram 1a (above). The addition of records to ISAM files. Diagram 1b (below). The addition of records to ICL 1900 Series indexed sequential files.

when additions made up 40% of the file. Most users have found more rapid degradation than this; these results may be due to the provision of a great deal of overflow space in the data cylinders, which is often not possible.

Process directly or batch and sort?

The ease with which updating of an indexed sequential file can be carried out directly often encourages users to do this. It is true that the need to batch updates and then sort them into order is avoided by this means. However, direct updating of the file is inherently slower for large numbers of records.

A decision between the two strategies should be based on the size of batch that can be made up. In cases such as payments through the post, this provides a natural batch size, increasing it by processing only every second or third day imposes an unnecessary delay that should be taken into account in the decision. The storage device used for the file and the time taken to sort updates will also be important.

The situation has been analysed for an IBM 3330 disc. Table 1 gives the figures presented in this analysis and Diagram 2 shows what this means in practice.

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2. Quantitative File Evaluation and Design, by A. Y. Montgomery and D. Hubbard, Proc 8th Australian Computer Conference, Canberra, 1978, Vol 3, pages 1242-1246.

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Join one of the friendliest crowds you could ever hope to meet. Enjoy your work on general commercial applications and score with the cash too! All we're asking is COBOL, CICS, IBM 370/138 DOS/VS experience. And what are you gaining? A top class position. Phone us and see.

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Come to the City and hit the big time for 6 months. Join a really big company but work for a really compact team. HW66, GCOS COBOL, plus experience of DMS and/or IDS/TDS make you the ideal person. You'd be working on a conversion from IBM 370 so you see it's a very special opportunity. Ring now for details. To start by the end of April.

£280 per week PDP11 Basic Midlands

£280 per week IBM CICS COBOL Various

£270 per week Univac Fortran Midlands

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Team Leader £300 per week North West

Come and put your stamp of authority on a big company's team. If you have experience of HW66 & DMIV and/or IDS/TDS GCOS and COBOL, you're the person who could create quite a destiny here. There's a 6 month contract starting from the end of April on offer and work on general commercial applications. Give us a ring now for this marvellous opportunity.

Project Leader £300 per week North West

Be someone big in the big City. Take a new project and a large team for at least 6 months and show what you can do. If you have 4 years experience of Design and Project management, plus experience in all aspects of Technical Design, HP3000 and knowledge of structured

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A big international organisation needs you. If you have 4 years technical design experience, can take a project to integrated testing and be involved in stock management and production you're the person we're looking for. Get in at the beginning of something new.

£300 per week Systems Designer IDMS Various

£300 per week Project Leader/Designer North West

£300 per week Project Leader UNIVAC North West

£280 per week Senior Analyst HP3000 Various

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Bedfordshire

£8,000 - £10,000

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We have been asked to recruit two senior software technicians to be responsible for teams in the following areas:-

Product Introduction Software

To lead a team engaged in releasing for customer use, newly developed or modified software, ensuring that standards are maintained and that the operations handbook conforms to the product. The team is also responsible for integration of existing released software into new operating systems.

Candidates must have supervisory experience coupled with a high degree of investigative ability. In-depth Assembler experience is preferable.

Design Maintenance Software

To lead team of programmers engaged in investigation and rectification of released software, monitor progress of all fault rectification and produce management information for distribution to customers. On occasion, the team is expected to provide field support on difficult system faults.

Candidates must have several years' experience in maintaining or developing software - preferably in Assembler.

Contact: Mike Creamer

JAMES BAKER ASSOCIATES, International Personnel Consultants,
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to £10,000

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If you are familiar with one or more of the following this could be your chance to make a real contribution to the company's push into the 80s.

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Information Processing People

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JBA**Project Leader - Engineering****North London Based c. £29,000**

The engineering group of leading U.K. firm, an UCL, is looking for a Project Leader to lead applications systems development and provide support in their engineering clients. Candidates, preferably scientific/technical graduates, should have a sound d.p. background in programming and systems analysis, and some supervisory experience at Project Leader level. The ability to communicate well with clients and colleagues is essential as is the drive to succeed in this exciting and challenging environment. Training in the use of Databases and other software tools will be provided.

Contact: Margaret Stevens

German Speaking Programmers and Analysts**All locations in Germany Sal. Nat. rates**

Our client, an established German Services organisation have been recently overwhelmed by requests for experienced d.p. professionals who have a command of the language - at least at conversational level. Of particular interest will be Programmers or Analysts with experience of any mainframe systems, either applications or software oriented. There are a variety of locations and types of organisations to consider and in some cases employment can be either permanent staff or long-term contractual.

Contact: Mike Creamer

Dutch Speakers**Central Holland from fl.65,000 p.a.**

JBA has been asked to help recruit Dutch speaking d.p. professionals for multinational development teams currently being set up in Holland. Naturally the main objective is to ensure that good communication is maintained between the projects and their Dutch users, so the company is prepared to pay a premium to suitable candidates.

A range of experience is sought - e.g. a Project Leader with good ICL 1900 and PLAN expertise through to Analyst/Programmers with IMS/DBL COBOL experience. Please for more details of the employment packages available and a discussion of the types of project you are seeking.

Contact: Andy Wright

CODASYL Database Design**Amsterdam c. £18,000 + Car + benefits**

A small, specialist Dutch company has several requirements for experienced database Designers and Analysts to work on new, advanced development projects. Duties will range from corporate systems strategy studies, through to technical design and project management so obviously candidates must have at least 7-10 years d.p. experience in all.

For most technical expertise must be a database design - e.g. DMS90/1100, IMS, IDSII, DMIV etc. and should include sound T.P. and on-line systems design. Applicants without project or team management experience are acceptable but will be expected to possess extremely good technical knowledge.

Contact: Andy Wright

2960 - Senior Programmers**East Midlands up to £8,000**

A division of an internationally famous organisation is seeking SENIOR PROGRAMMERS to assist in the development of commercial applications involving on-line, data base and data comms techniques. Applicants should have a good education and at least 4 years COBOL programming experience.

Contact: Bev Stevens

INSURANCE COMPANY Systems Analysts**South of England**

Salaries up to £7,100 + mortgage subsidy + non-contributory pension + free permanent health scheme + low interest loans + subsidised canteen and sports/social club + all relocation expenses + other benefits. A very attractive prospect for career-minded Analysts. Known to progress in a growth-oriented modern company putting in database and TP systems. We are keen to hear from Analysts who have a sound business background, a good knowledge of COBOL and experience of system design over two to three years. Ideally in an accounting, financial or banking environment.

Contact: Mike Creamer

COBOL Programmer (12 months)**Chingford, London £5,000**

A manufacturing organisation involved in consumer and pharmaceutical products is seeking programmer potential. Membership of a project team is ensured and intensive audio/visual training offered from day one. The company are dedicated IBM users and the training will be tuned to CICS and DL/I techniques.

Applicants really must have at least one year (post training) COBOL programming experience on IBM equipment in a commercial/manufacturing environment.

Drive and enthusiasm is sought together with an ambitious and enterprising approach to the d.p. industry.

Contact: Mike Creamer

Analyst/Programmer**London up to £8,000**

Our client, a large international trading and banking organisation, has a vacancy for an Analyst/Programmer to join a small team developing commercial systems on HP 3000.

Applicants should have at least three years experience of programming and design in commercial applications. Knowledge of real-time, communications and database would be an advantage.

Excellent salary, opportunity and benefits.

Contact: Jim Baker

JAMES BAKER ASSOCIATES,
International Personnel Consultants,
32 Savile Row, London W1.
Tel: 01-439 9311.

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There are plenty of run-of-the-mill jobs about, some interesting jobs which are badly paid, and some highly-paid jobs which are nevertheless tedious.

This opportunity is SPECIAL because you will have the chance of learning sophisticated methods. (Including database and communications) on a large mainframe, using on-line program development techniques, and at the same time enjoy a good earnings package, with sound career prospects.

We are recruiting for clients, a well-organised London installation, and all the work is on-site. We would like to hear from programmers with at least 1½ years' practical experience (for less senior positions), ideally including

COBOL. Team leadership ability will be required for more senior candidates.

Please ring us in confidence for a talk, quoting ref 238CW or leave a message on our answering machine after hours and we will contact you.



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So if you are a graduate with two years' programming or hardware experience and are interested in working with microprocessors, please ring Chris Hill on 01-953 2030 ext. 3449.

Alternatively write to him at Marconi Avionics Limited, Elstree Way, Borehamwood, Hertfordshire, or call 01-207 3455 (Day or Night), and we'll send you more information.

Those posts are open to both men and women. Assistance with local authority housing could be made available.

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Computer Operations Controller**Stanmore, Middx. Up to £7,000 plus car**

Bejam are the market leaders in the freezer food retail trade. An opening has arisen for an Operations Controller within the Data Processing Department which is based in Stanmore village. Reporting to the Data Processing Director, the successful applicant will be responsible for the Operations Department currently comprising 20 staff which includes data preparation, data control clerks and computer operators.

It is unlikely that applicants less than 35 years old will have had the relevant experience in a computer operations environment which should have embraced punch card/VDU equipment and a medium size computer configuration.

Applicants must have a proven ability to communicate, motivate, and possess qualities of leadership to achieve the best from a small team. A car will be provided with no restriction on private use. Other benefits include a low cost pension plan and a food discount scheme.

For application form please apply to: Carol Lemoine, Bejam Group Ltd., 1 Garland Road, Honeywell Lane, Stanmore, Middx. Tel: 01-951 1811.

Bejam The Freezer People.

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£
(DR/872) 15 + months financial systems 5600
(DR/873) 15 + months ICL commercial background 5250
(DR/874) 18 + months manufacturing systems (IBM site) 8000
(DR/875) 18 + months IBM/ICL financial background 8200
(DR/876) 18 + months commercial environment 8300
(DR/877) 2 + years manufacturing environment 8500
(DR/878) 2 + years commercial experience (COBOL background) 8200
(DR/879) 2 + years ICL commercial environment 8400
(DR/880) 2 + years IBM (CICS) 8800
(DR/881) 3 + years senior computer specialist (ICL background) 7600
(DR/882) 3 + years senior IBM position, commercial environment 7500
(DR/883) 3 + years manufacturing systems (IBM background) 7800

PROGRAMMERS

£
(DR/884) 15 + months IBM COBOL environment 5600
(DR/885) 15 + months commercial IBM installation 5600
(DR/886) 18 + months COBOL experience (any mainframe) 5800
(DR/887) 18 + months IBM/ICL financial background 5900
(DR/888) 18 + months Honeywell environment 6200
(DR/889) 18 + months IBM COBOL/ASSEMBLER 6200
(DR/890) 18 + months COBOL experience 6000
(DR/891) 2 + years COBOL experience, any mainframe 7000
(DR/892) 2 + years IBM/ICL financial environment 6800
(DR/893) 2 + years Honeywell environment (DS/TDS) 7500
(DR/894) 3 + years IBM COBOL 7800
(DR/895) 3 + years commercial Honeywell background 7800
(DR/896) 3 + years senior technical ICL position 7800
(DR/897) 3 + years systems experience, Honeywell environment 8000
(DR/898) 3 + years senior IBM position 9000

GREATER MANCHESTER**ANALYSTS**

£
(DR/899) 15 + months ICL background 5600
(DR/900) 15 + months Honeywell COBOL background 5800
(DR/901) 15 + months analyst/programmer positions (most mainframes) 5900
(DR/902) 15 + months most mainframes 5700
(DR/903) 18 + months ICL environment 6000
(DR/904) 18 + months financial background 6100
(DR/905) 18 + months experienced IBM analysts 6000
(DR/906) 18 + months Burroughs environment 6100
(DR/907) 2 + years Honeywell background 6800
(DR/908) 2 + years solid commercial IBM background 6800
(DR/909) 2 + years mini environment (OEC experience essential) 6500
(DR/910) 2 + years sales support (most mainframes) 7000
(DR/911) 3 + years senior IBM position (programming background) 7000
(DR/912) 3 + years Honeywell environment (DS/TDS background) 7000
(DR/913) 3 + years senior position (IBM background) 7500
(DR/914) 3 + years IBM experience (ASSEMBLER background useful) 7200
(DR/915) 3 + years senior position (ICL environment) 7300
(DR/916) 3 + years senior IBM position, programming background 7600

PROGRAMMERS

£
(DR/917) 15 + months ICL COBOL environment 5400
(DR/918) 15 + months ICL/Honeywell COBOL environment 5800
(DR/919) 15 + months large IBM site (COBOL/ASSEMBLER preferred) 5800
(DR/920) 15 + months commercial ICL environment 5800
(DR/921) 18 + months ICL on-line COBOL experience 5700
(DR/922) 18 + months IBM COBOL programming experience 5900
(DR/923) 18 + months software house position, car provided 6300
(DR/924) 18 + months most mainframes analyst/programmer background 6500
(DR/925) 18 + months financial IBM COBOL environment 6700
(DR/926) Mini sales support position, car provided 7000
(DR/927) 2 + years Burroughs environment 6500
(DR/928) 2 + years ICL COBOL environment 6500
(DR/929) 2 + years IBM analyst/programmer (financial background) 6800
(DR/930) 2 + years IBM position - COBOL and/or ASSEMBLER 6900
(DR/931) 3 + years Burroughs COBOL (MCPV) 7000
(DR/932) 3 + years senior IBM position (ASSEMBLER background) 7000
(DR/933) 3 + years commercial Honeywell installation 7000
(DR/934) 3 + years IBM systems programming experience 8000
(DR/935) 3 + years all large mainframe backgrounds, car provided 7800

NORTH WEST CONTACT:

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ADDRESS	
LANGUAGES USED	
PHONE HOME	
BUSINESS (will be used discreetly)	
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MACHINES USED	
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£
(DR/936) Senior analysts - manufacturing systems 8000
(DR/937) 3 + years commercial systems 7500
(DR/938) 18 + months commercial systems 6250
(DR/939) Senior analysts financial systems 7780
(DR/940) 2 + years commercial (COBOL background) 6500
(DR/941) 3 + years commercial (PL/1 background) 7500
(DR/942) 2 + years ICL preferred 7250
(DR/943) 2 + years analyst programming 7000

PROGRAMMERS

£
(DR/944) 2 + years Univac COBOL 6000
(DR/945) 2 + years COBOL any mainframe 6250
(DR/946) 3 + years Honeywell COBOL 6500
(DR/947) 18 + months COBOL - new hardware 5600
(DR/948) 12 + months ICL COBOL 5250
(DR/949) 3 + years ICL COBOL 7200
(DR/950) 2 + years COBOL any machine 6000
(DR/951) 12 + months Honeywell COBOL 4700
(DR/952) Senior programmers COBOL any mainframe 6750
(DR/953) 18 + months Honeywell COBOL 5700
(DR/954) 2 + years IBM COBOL 6000

WEST YORKSHIRE**ANALYSTS**

£
(DR/955) 4 + years (including programming background) 7000
(DR/956) 2 + years commercial systems 6500
(DR/957) 18 + months plus programming background 6500
(DR/958) 2 + years financial systems (COBOL background) 7500
(DR/959) 2 + years commercial systems (COBOL background) 7500

PROGRAMMERS

£
(DR/960) 2½ + years COBOL 6000
(DR/961) 18 + months IBM COBOL 6000
(DR/962) 2 + years COBOL on any mainframe 5800
(DR/963) 18 + months ICL COBOL - 2900 site 6500
(DR/964) 2 + years ICL COBOL 5500
(DR/965) 18 + months COBOL on any mainframe 5500
(DR/966) 2 + years ICL COBOL 6000

TYNE & WEAR**ANALYSTS**

£
(DR/967) 18 + months commercial systems 6500
(DR/968) 2 + years financial systems 7250
(DR/969) 3 + years manufacturing systems 7500
(DR/970) 2 + years (COBOL background) 6800
(DR/971) 3 + years manufacturing systems 6500
(DR/972) 2 + years production systems 7500
(DR/973) 2 + years (including programming background) 7000

PROGRAMMERS

£
(DR/974) 2 + years COBOL on any hardware 5500
(DR/975) 18 + months IBM COBOL 6500
(DR/976) 3 + years PL/1 8500
(DR/977) 2 + years IBM COBOL 8500
(DR/978) 3 + years ICL COBOL 6000

WEST MIDLANDS, N.E. & YORKS. CONTACT

CATHY SCOTT

SCOTLAND**ANALYSTS**

£
(DR/979) 2 years IBM preferred 6500
(DR/980) 18 months analyst programming 6000
PROGRAMMERS
(DR/981) 3 + years IBM systems programming 7500
(DR/982) 4 + years CICS, OL/1 8500
(DR/983) 2 years IBM 370 systems programming 6500
(DR/984) 3 + years COBOL IBM preferred 7250

SCOTLAND CONTACT

KAY MacDONALD

CAMBRIDGESHIRE**ANALYSTS**

£
(DR/985) 3 + years project leader, financial systems 9000
(DR/986) 3 years database designer + administration 8000
(DR/987) 2 + years major projects experience 8000
(DR/988) All d.p. backgrounds 7000

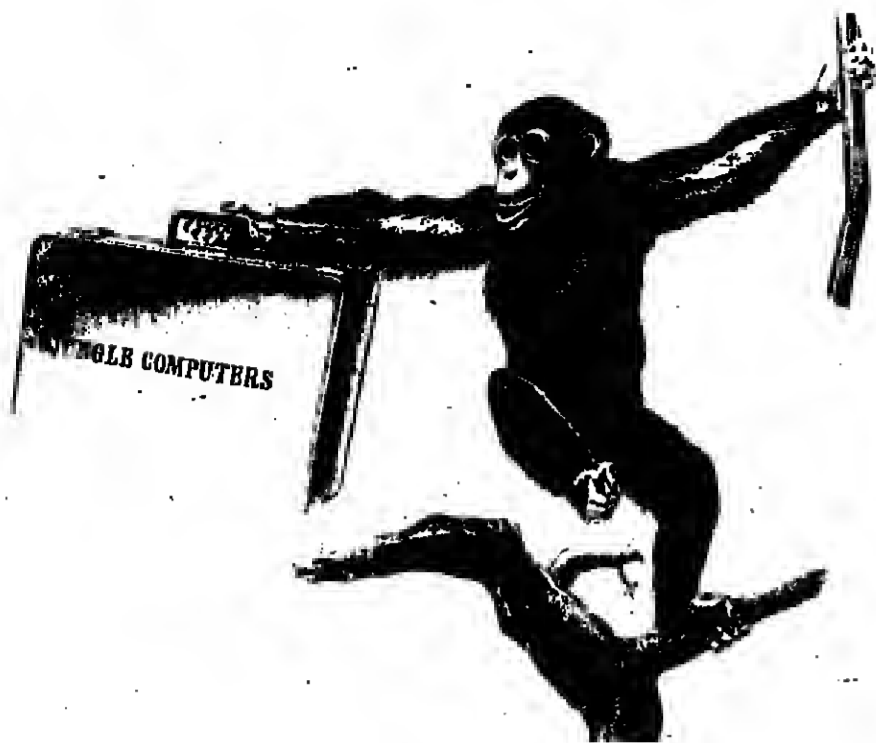
PROGRAMMERS

£
(DR/989) 2 + years systems programmer PL/1, CICS, DOS 8000
(DR/990) 1 year minimum - all grades PL/1 6000

CAMBRIDGESHIRE CONTACT

ROGER PICKIN

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Successful candidates may be offered the opportunity to work for about two years in one of the laboratories of our parent company GTE in the United States before joining our permanent staff in Belgium.

Interested persons should apply in writing, with curriculum vitae, to Mr. L. Luyten, GTE ATEA N.V., Industriepark Klein Gent, 2410 Herentals, Belgium who will treat all applications as strictly confidential.

GTE ATEA

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Experience — At least two years' practical COBOL and ASSEMBLER either as a Programmer or Analyst/Programmer.

BUSINESS ANALYSTS

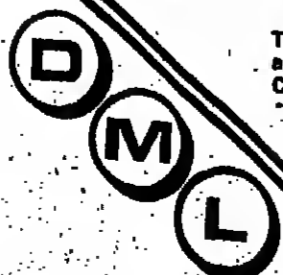
Function — To aid the user departments in the solution of their business problems and define the necessary data processing service.
Experience — At the senior level, candidate should be educated to degree standard or equivalent, have at least 3 years' systems analysis experience and a general grounding in a commercial environment (eg: O & M, Accountancy).

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DML COMPUTER PERSONNEL SERVICES
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Please quote reference CP/77/E



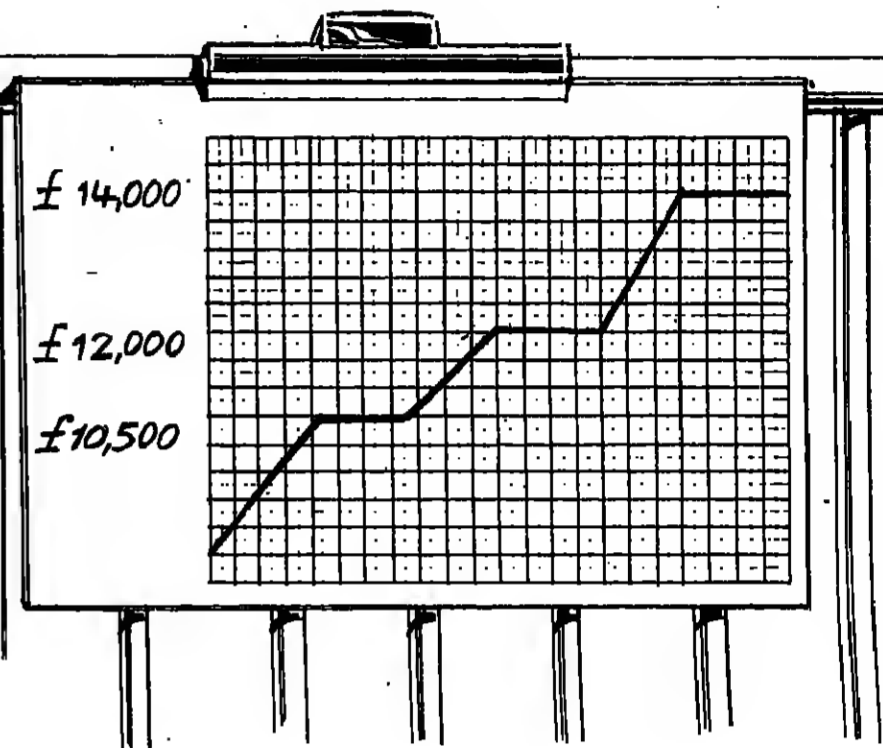
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assurance, subsidised restaurant, mortgage assistance, sports and social club, season ticket loan, free BUPA and medical screening through the most advanced service of its kind in Europe.

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74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 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24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 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24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57,

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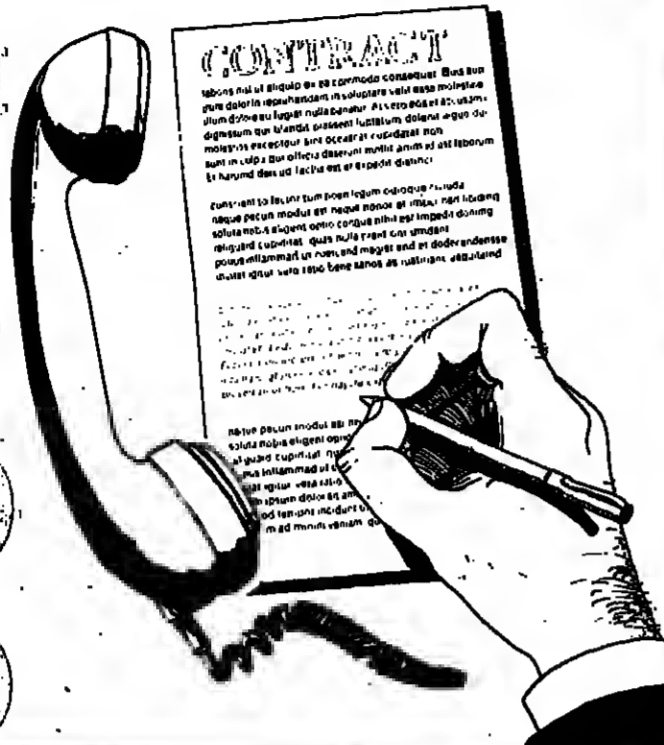
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Enquiries and interviews by arrangement with the Secretary, Computing Centre, Chelsea College, Fulham Road, London SW6 Tel 81-736 1244, Ext. 272.

(127)

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Computer Aided Design Centre

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UNIVERSITY OF NOTTINGHAM CRIPPS COMPUTING CENTRE System Programmer

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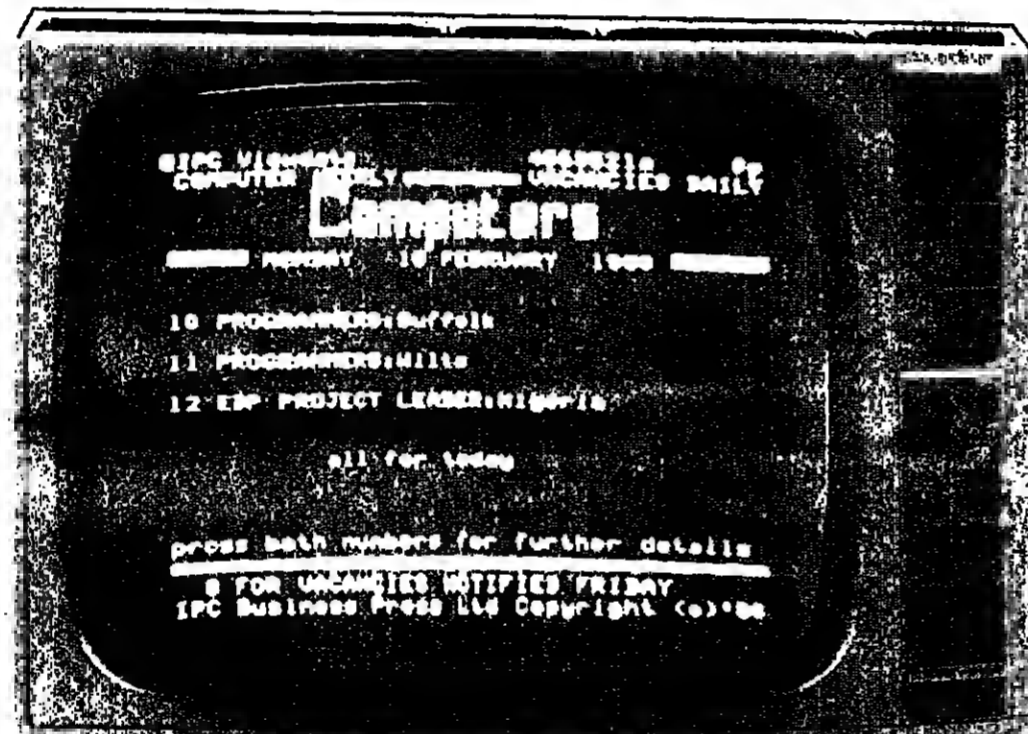
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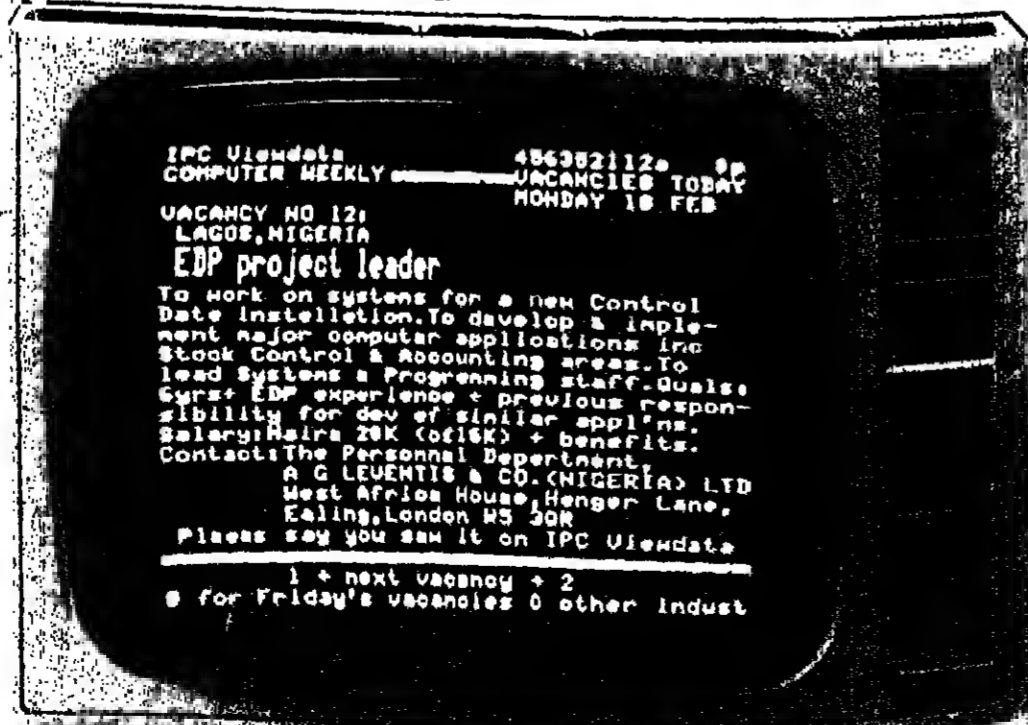
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We operate over 50 NDS terminals from our Burton and Carlisle factories, utilizing 3705 and 3374 controllers. So we're now operating an extremely sophisticated and dynamic computing environment - and we're looking for computer professionals to do it justice. We need these men or women:

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Someone with at least three years' solid experience of relevant systems and fluent JCL. You should be a shift leader or senior operator now, with the personality and maturity of judgement to lead one of our professional team.

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This is a non-shift appointment involving work scheduling and planning computer utilisation. You should have at least 12 months experience in Operations Analysts or as a senior operator. A knowledge of JCL would be an advantage. Candidates should be good communicators as the work involves considerable liaison at all levels with user departments.

Pirelli offers competitive salaries plus a range of valuable fringe benefits, including relocation expenses. Find out what we can offer by writing or telephoning to Alan Gloor, Personnel Officer, Pirelli Limited, Derby Road, Burton on Trent, Staffs. Tel: Burton 66301 ext. 216.



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THE SCHOOL OF ENGINEERING has the following vacancy to be filled as soon as possible

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The person appointed will be expected to join a small team responsible for the BSC/TEC Certificate in Computer Studies 2001 745 and 747 courses. A knowledge of microprocessor systems and/or commercial data processing would be an advantage.

Salary: Burnham Scale, Lower Grade 1. Up to £24,28 p.a. plus £600 p.a. London Allowance. Application form and further particulars available from the Chief Administrative Officer, Merton Technical College, Morden Rd., London SW13 2JF. Merton College is an equal opportunities employer. Shortlisted candidates should be interviewed within two weeks.

—R. Davies, Acting Director of Education and Acting Clerk to the Governors.

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Specialist computer agency. E.C.4. requires experienced self-motivated person for mainframe system. High salary plus excellent commission. System Operator Services, 4 Ludgate Circus, E.C.4. 01-283 5945.

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You will benefit from an initial confidential discussion with us.

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Our client based in South London is urgently seeking an experienced person to take charge of their G3 Support Section. The ideal candidate will have substantial managerial experience in a large installation, together with an in-depth knowledge of G3 and ICL utilities.

3-4 years' programming experience in Cobol is essential. Salary £7,200+

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Control own Programming/Analysis team in key/miniutes. Strong Unit. Wide user department liaison.

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PROGRAMMERS/ANALYSTS

capable of working from existing functional specifications, a global system design and database information; this with a minimum of supervision.

The project is Statistical, on IBM 370/138 hardware running under OS/VS1 in PL/1. Jackson programming techniques are to be used and processing of tables will follow a standard table system. A thorough knowledge of COBOL would be as acceptable as that of PL/1 for these particular positions.

Location: The Netherlands.

DATABASE CONSULTANT

to instigate a database structure and reporting system in an IBM 370/158 and 188 environment. A first-class knowledge of IMS Database batch processing for report listing and on-line processing for enquiry handling must be held.

Location: The Netherlands.

PROGRAMMERS

with a good knowledge of MARK IV are required to work on both stock control and accounting systems. Hardware used here is IBM 370/138.

Location: The Netherlands.

3790 PROGRAMMERS

to continue development of a distributed processing system and thus good previous experience of 3790 communications processing and macro assembler is essential.

Location: The Netherlands.

RPG II PROGRAMMER

to support general commercial systems running on IBM System 34 hardware. These include order processing and financial systems and, although not mandatory, some knowledge of COBOL would be well advantageous. Again, good previous experience will be looking for.

Location: The Netherlands.

UK CONTRACT OPPORTUNITIES

IBM ANALYSTS

to work on Insurance applications running on IBM 3031. Previous programming experience in COBOL under OS/VS1 essential. Knowledge of Insurance systems will be looked for.

Location: South Coast.

IBM ANALYSTS AND PROGRAMMERS

to work on IBM 370/168 using COBOL. Sound knowledge of IMS is essential. These opportunities are of a long term nature.

Location: Bedfordshire.

All the above opportunities carry really first-class remuneration — together with generous concessions already negotiated with the Dutch taxation authorities — plus four weeks paid holiday per annum, paid national holidays and certified sick leave, as well as a holiday bonus and the full support of the administrative staffs based in our Dutch offices.

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Ann Arledge, Marketing and Recruitment Director, Industrial Artists (Hitchin) Limited, 21 Bancroft, Hitchin, Herts SG5 1JW. Tel: (0462) 527412/3 (Day) or (0462) 700701 (EvenWeekends)

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Copy Deadline

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Are you successful in the bureau mini or mainframe market place? Do you enjoy the technical content of selling highly sophisticated computers systems to discerning users? Then this is **your** opportunity not only to gain the prestige of working for the world's leading manufacturer of large sophisticated computer systems, but also to receive the rewards for doing so. A high basic salary and an excellent incentive scheme end naturally car and expenses are on offer.

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Suite 201/6 Albany House 324 Regent Street London W1R 5AA 01-637 9611

SOFTWARE/HARDWARE SPECIALISTS



If you're a self-starter, here's a place in the sun that offers you the moon

Our Client is a UK based company currently selling a well-known range of computer hardware to European markets. As part of an exciting programme of expanding interests, a new company will be launched to sell into Rhodesia a range of mini-computer systems already successfully marketed in the U.K. We have been appointed, as specialists recruiters of computer personnel, to find a **SOFTWARE SPECIALIST** and a **HARDWARE SPECIALIST** to support this expansion into Rhodesia.

Are you a self-starter? Successful candidates for both opportunities will be resilient, ambitious and able to work on their own initiative. You'll be at least 25 years old, with good experience, and able to show us that you're something of an

entrepreneur. You'll welcome a pressure job that will stretch your abilities but at the same time give you immense career satisfaction. The **Software Specialist** will have an in-depth knowledge of operating systems and an understanding of computer applications. The **Hardware Specialist** must be able to fix anything from a printer to a complex C.P.U. In both cases you will be responsible for training local staff for your eventual take-over.

What's in it for you! All the benefits you would normally associate with an overseas assignment including:
■ 2 year contract on highly attractive terms
■ Free travel to/from Rhodesia
■ Free medical scheme, pension fund etc.

The scope is unlimited! The market in Rhodesia is wide open for development. To compensate for the challenge of working entirely on your own initiative, it's nice to know that there's virtually no real competition.

But, if money is your **ONLY** interest, then our client is probably not the company you are seeking. What they do say is if you provide the commitment they will certainly give the motivation — a healthy climate in which to progress your career.

If you match the Brief, then respond to the challenge. Please ring or write quoting ref. JMC/12 to: **Insight Marketing & Personnel Consultants Ltd.** 72-75 Marylebone High Street London W1M 4AJ Tel: 01-488 5844



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First-class job satisfaction will result from a deep involvement with new and existing products plus opportunities to travel to Europe.

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To find out more about this unique London area opportunity, ring us quoting ref. 967/CW, or write briefly. Messages will be recorded after hours.

EDP SYSTEMS 01.637 52-53 Margaret St. London W1N 7FF 5796

Systems Analyst/Programmer MUNICH

Motorola is growing more rapidly than any of its major competitors in the world of semiconductor technology. Since our data processing needs are growing at the same pace as our business, we have a requirement in our newly created Munich installation for a capable Analyst/Programmer with a solid computer oriented business background. This represents an unrivalled opportunity for a talented individual with technical ability and ambition to advance his/her career, whilst at the same time gaining extensive experience of business orientated computer systems. The ideal candidate, male or female, will be educated to degree level with substantial experience of IBM Large Scale Systems and JCL, Cobol and Mark IV Languages. A minimum of four years' relevant experience is essential and some understanding of German would be an advantage.

Munich itself is one of Europe's most beautiful cities where you will have the opportunity to sample a highly attractive Continental life-style and enjoy an exceptional standard of living. Excellent career opportunities are available and a generous relocation expenses package will be paid.

This is a double opportunity you cannot afford to miss. To find out more, contact Brian Bedford, Personnel Director, Motorola Limited, Colvilles Road, East Kilbride, SCOTLAND. Telephone: East Kilbride 39101.



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We have the skills to provide career guidance for sales and marketing personnel as well as having access to all the major computer organisations. This means we are ideally equipped to find the right jobs with the best companies.

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AB ALLEN-BRADLEY

It could mean exciting new opportunities with an expanding company situated in Poole on the sunny south coast of England.

Allen-Bradley Numerical Controls Limited, a subsidiary of the Allen-Bradley Company in the United States, is anxious to talk to experienced

SOFTWARE ENGINEERS

to join the team responsible for the software development of micro-processor based numerical control systems.

Proficiency in mini or micro assembler language programming is essential, and experience in machine tool control would be a real advantage.

An attractive employment package, which includes a generous relocation allowance, is available for the right people.

Interested? Phone or write to:

Dave Heern, Software Development Manager
ALLEN-BRADLEY NUMERICAL CONTROLS LTD.
Hatchpond Road, Poole, Dorset BH17 7LQ
Bournemouth 690011

OPERATIONS

OPS SUPPORT £6000 Our client, a large IBM installation based in Herts., currently require people with excellent OS JCL for their expanding ops support team. Salary will be commensurate with experience. Ref. C2926.

SHIFT LEADER £6000 IBM installation based in Bedfordshire are looking for an operator capable of fulfilling the role of shift leader. Min. of 2 years' George II and/or EXEC-2 exp. Days and evenings. Ref. J2577.

DAYS ONLY OP £6000 One year's DOS VS. POWER VS. exp. needed for this days only position. Excellent company benefits inc. twice yearly bonus. Ref. C2914.

JUNIOR OP £4,250 Small site in Surrey require an operator with approx. 6 months' exp. of any EDP equipment. Two shifts. Staff discount on company goods & excellent bonus scheme. Ref. J2925.

OPERATORS £5,800 Several installations in and around London require good OS operators with minimum of a year's exp. Most of these positions offer definite career advancement. Ref. C 605.

24-hour Answerphone

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THE SALES BIT

Proper planning essential to selling success

I'M a sucker for sales anecdotes, truisms, catchphrases and the like. I recently picked up a phrase from a client within the computer industry (thank you, George!) which I believe is extremely pertinent.

Having presented you with the four Ps that define marketing ("the right product in the right place at the right price producing the right profit" — remember?) I am pleased to have the opportunity of presenting you with the five Ps of sales organisation "poor planning promotes pathetic performance."

That's absolutely true, you know. You'll never succeed in selling by constantly playing it off the cuff! My constant observation is that really experienced senior salesmen, with the kind of knowledge that should make them best qualified of all for handling their selling in an impromptu manner, are in fact the ones who are most heavily involved in planning every aspect of their selling activity. The fact is that their experience has shown them how much sales success is a direct function of personal organisation and planning.

The answer to the question "What aspect of selling is most dependent on the five planning?" is — all of it! When you start to analyse the basic situation of having a sales territory and setting about achieving a quota for the year ahead the potential number of individual, albeit inter-related, planning situations is enormous.

Let's take the sales call, for example. Many salesmen, especially those who are working within a relatively static marketplace, calling on the same clients on a regular basis, supplying a virtually unchanging product, can convince themselves that selling to a predetermined pattern, or even selling at all (in the true sense of the word) is a complete waste of time. They become "order takers."

Yet experience shows that no matter what the product or marketplace, the sales call is a battle. It is a battle between the sales call and the needs of the individual buyer and the capability of his product. The sales call is basically consisting of five stages: attention; interest; desire; credibility; close.

Attention: Having completed the appropriate pre-call preparation, the first stage of the sales call must be to establish an approach which will gain the individual attention of the buyer. This is the best achieved with an opening statement that gives the salesman's reason for being there and why it is in the buyer's interest to listen carefully and become involved. Tell 'em what you're going to tell 'em.

Interest: The next stage is to do whatever is necessary to establish real interest in the proposition being put forward. This cannot be achieved by a mimbling, unprepared presentation, devoid of visual aids. More to the point, the buyer is unlikely to show much interest if he has no real need of the product. Only effective planning and customer analysis can help the salesman to avoid such pitfalls.

Credibility: It is easy for the salesman to convince himself that the sale has been made once the buyer acknowledges both his own need and a desire to purchase the kind of solution that has been presented to him. Unfortunately, what can often happen is the achievement of a missionary-like "conversion" without getting a commitment from the buyer to join his particular "church," i.e. "I'm now convinced I need a product like yours, but I'll get a cheaper one elsewhere or the same thing from a more established company."

This can always happen if the salesman fails to establish the professional credibility of his company, his product and himself. Telling the "company story" and producing relevant "reference sales" can greatly assist in this area. The salesman's professional credibility is to a great degree a function of his personal organisation and knowledge.

Close: Having successfully negotiated the preceding stages, the sales call has to be applied. It could be a final close, an interim close or simply an agreement for further action to be taken. Whatever the circumstance the sales call should always end with a positive sales close of some kind.

The sales call should therefore take the form of a predetermined structure within which both predictable and unforeseen factors can be brought into a strategy based on an understanding of the buyer's business and its typical needs.

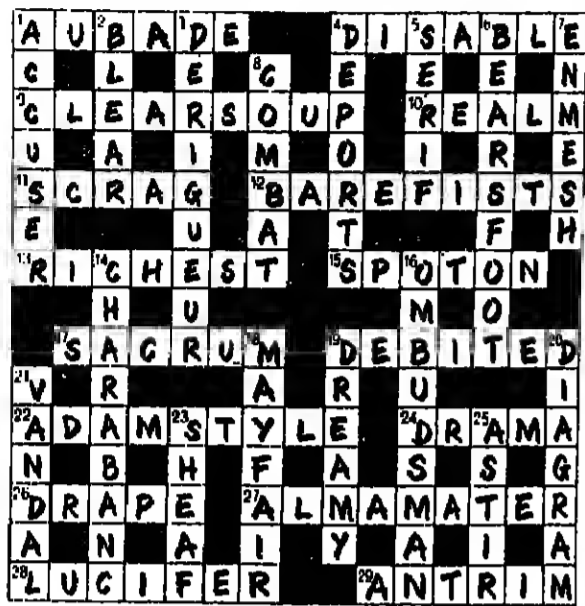
Puzzle Answer

The third Perfect number is 496, which has the divisors 1, 2, 4, 8, 16, 31, 62, 124 and 248.

CW Prize Crossword No 3**SOLUTION**

Winner of Computer Weekly Prize Crossword No 3 is Chris Clark, a software engineer with IBM at Chiswick. He receives the first prize of £10. Second prizes of £5 each go to Janet Allan, a programmer at British Steel's Clydebank Works at Cambuslang, Scotland, and David Wells of Hopton, near Swindon, a chief programmer with Vickers.

Prize Crossword No 4 will appear next week, April 3



European Support Organisation of a highly successful American Manufacturer of Small Business Systems seek for its Monaco Base

SOFTWARE SUPPORT SPECIALIST

to assist an expanding network of European Distributors. Applicants should be fluent in English and preferably German and French and experienced in two of the following:

1. BUSINESS APPLICATIONS SYSTEMS DESIGN AND BASIC LANGUAGE
2. BASIC OPERATING SYSTEM AND FILE MANAGEMENT CONCEPTS FOR MULTI TESTING MICRO COMPUTER SYSTEMS WITH DISKETTE AND DISK MASS STORAGE
3. PRACTICAL USE OF DATA COMMUNICATIONS IN DISTRIBUTED PROCESSING ENVIRONMENT.

Applicants must be willing to travel considerably throughout Eastern and Western Europe and occasionally further afield and be able to teach high-level programming methods and systems architecture in relation to the product range. Relocation assistance will be given to successful applicants.

Please apply in writing, giving outline of current situation, qualifications and relevant experience to Brook P. Taylor or Roy J. Goode, L'Esportel Avenue Princess Grace, Monte Carlo, Principality of Monaco. (127)

EASTER COPY DEADLINES

In view of the Easter holiday, the following deadlines for the receipt of classified advertisements copy will apply:

Issue dated April 3rd
Copy deadline Thursday, March 27th
Issue dated April 10th
Copy deadline Monday, March 31st

COMPUTER WEEKLY CLASSIFIED

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JBA

Project Leader - Engineering

North London Based c. £29,000

The engineering group of leading U.K. bureau, UCL, is looking for a Project Leader to lead applications systems development and provide support to their engineering clients. Candidates, preferably scientific/technical graduates, should have a sound d.p. background in programming and systems analysis, and some supervisory experience at Project Leader level. The ability to communicate well with clients and colleagues is essential as is the drive to succeed in this exciting and challenging environment. Training in the use of Databases and other software tools will be provided. **Contact: Margaret Stevens**

German Speaking Programmers and Analysts

All locations in Germany Sal. Nat. rates

Our client, an established German Services organisation have been recently overwhelmed by requests for experienced d.p. professionals who have a command of the language - at least at conversational level. Of particular interest will be Programmers or Analysts with experience of any mainframe systems, either applications or software oriented. There are a variety of locations and types of organisations to consider and in some cases employment can be either permanent staff or long-term contractual. **Contact: Mike Creamer**

Dutch Speakers

Central Holland from fl. 65,000 p.a.

JBA has been asked to help recruit Dutch speaking d.p. professionals for multinational development teams currently being set up in Holland. Naturally the main objective is to assure that good communication is maintained between the projects and their Dutch users, so the company is prepared to pay a premium to suitable candidates.

A range of experience is sought - e.g. a Project Leader with good ICL 1900 and PLAN expertise through to Analysts/Programmers with IMS/OLI COBOL experience. Please for more details of the employment packages available and a discussion of the types of project you are seeking. **Contact: Andy Wright**

CODASYL Database Design

Amsterdam c. £18,000 + Car + benefits

A small, specialist Dutch company has several requirements for experienced database Designers and Analysts to work on new, advanced development projects. Duties will range from corporate systems strategy studies, through to technical design and project management so obviously candidates must have at least 7-10 years d.p. experience in all.

Foremost technical expertise must be a database design - e.g. DMS90/1100, IDMS, IDSII, DMV etc. and should include sound T.P. and on-line systems design. Applicants without project or team management experience are acceptable but will be expected to possess extremely good technical knowledge. **Contact: Andy Wright**

2960 - Senior Programmers

East Midlands up to £8,000

A division of an internationally famous organisation is seeking SENIOR PROGRAMMERS to assist in the development of commercial applications involving on-line, data base and data communication techniques. Applicants should have a good education and at least 4 years COBOL programming experience. **Contact: Bev Stevens**

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Salaries up to £7,100 + mortgage subsidy + non-contributory pension + free permanent health scheme + low interest loans + subsidised canteen and sports/social club + all relocation expenses + other benefits.

A very attractive prospect for career-minded Analysts, keen to progress in a growth-oriented modern company putting in database and TP systems, promising exciting design and development work well into the 1980's. We're keen to hear from Analysts who have a sound business background, a good knowledge of COBOL and experience of system design over two to three years, ideally in an accounting, financial or banking environment. **Contact: Mike Creamer**

COBOL Programmer (12 months)

Chingford, London £5,000

A manufacturing organisation involved in consumer and pharmaceutical products is seeking programmer potential. Membership of a project team is ensured and intensive audio/visual training offered from day one. The company are dedicated IBM users and the training will be based on CICS and DL/I techniques.

Applicants really must have at least one year (post training) COBOL programming experience on IBM equipment in a commercial/manufacturing environment.

Drive and enthusiasm is sought together with an ambitious and career-minded approach to the d.p. industry. **Contact: Mike Creamer**

Analyst/Programmer

London up to £8,000

Our client, a large international trading and banking organisation, has a vacancy for an Analyst/Programmer to join a small team developing commercial systems on HP 9000.

Applicants should have at least three years experience of programming and design in commercial applications. Knowledge of real-time communications and database would be an advantage. Excellent salary, opportunity and benefits. **Contact: Jim Baker**

JAMES BAKER ASSOCIATES,
International Personnel Consultants,
32 Savile Row, London W1.
Tel: 01-439 9311.

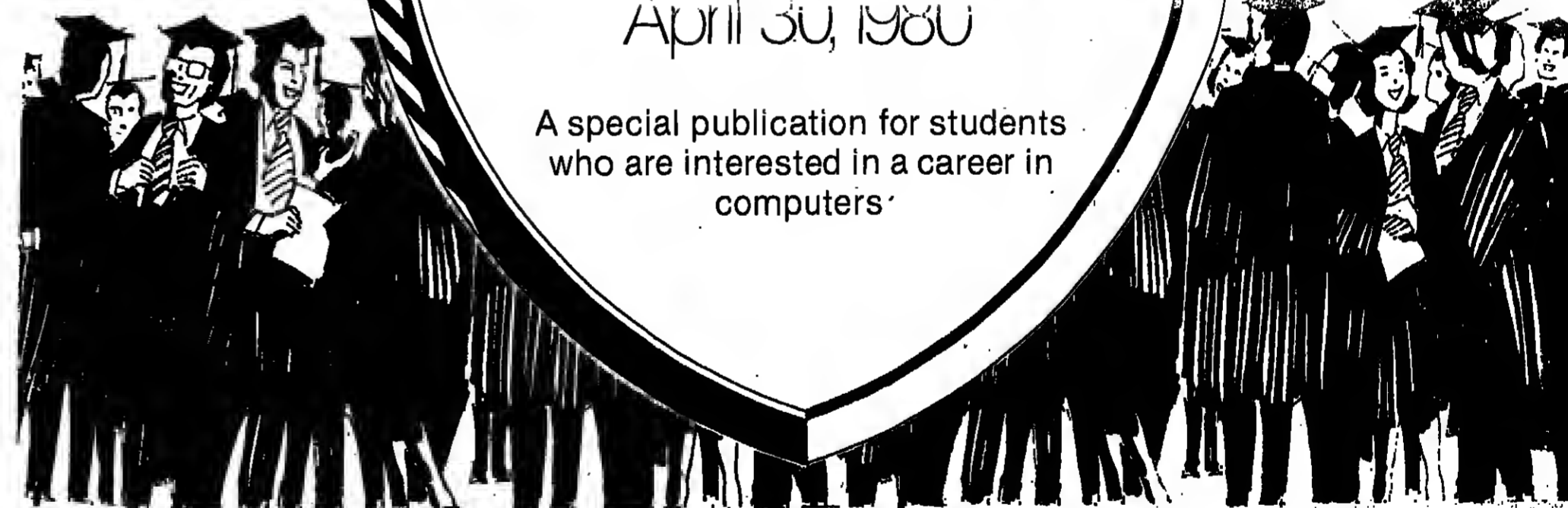
10,000 PRIME GRADUATE RECRUITMENT PROSPECTS FOR 1980

COMPUTER WEEKLY

GRADUATE RECRUITMENT

April 30, 1980

A special publication for students who are interested in a career in computers



Computer Weekly - Britain's leading computer newspaper will be publishing a special Graduate Recruitment Supplement on April 30.

Although there continues to be a significantly high demand for professional data processing personnel, very little information is available to guide young people into a career in computers. This supplement will help to fill this information gap by reporting on the latest developments in the industry and give useful information and advice to students on training, career progression and salary expectations etc.

Circulation will be on a requested basis only free of charge to those students who will shortly be graduating and who have expressed an interest in a career in computers. All higher education establishments throughout the U.K.

have been informed about the supplement including those colleges who run the government-sponsored Threshold and TOPS courses as well as the many commercial computer schools. Based on bulk orders already received, circulation will be a minimum of 10,000 copies.

If your organisation is interested in recruiting graduates to take up a career in computers, then this supplement provides an ideal opportunity for you to reach your prime recruitment prospects and outline the opportunities you are able to offer. The supplement will be printed tabloid, the same size as Computer Weekly. Careers advertisements published will run through the supplement and a few special positions solve on a page with editorial or facing will be available.

Should you require any additional information please contact your nearest Computer Weekly classified sales office.

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COMPUTER WEEKLY

GRADUATE RECRUITMENT